The Iron Age

A Review of the Hardware and Metal Trades.

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The Bruckner Revolving Furnace.

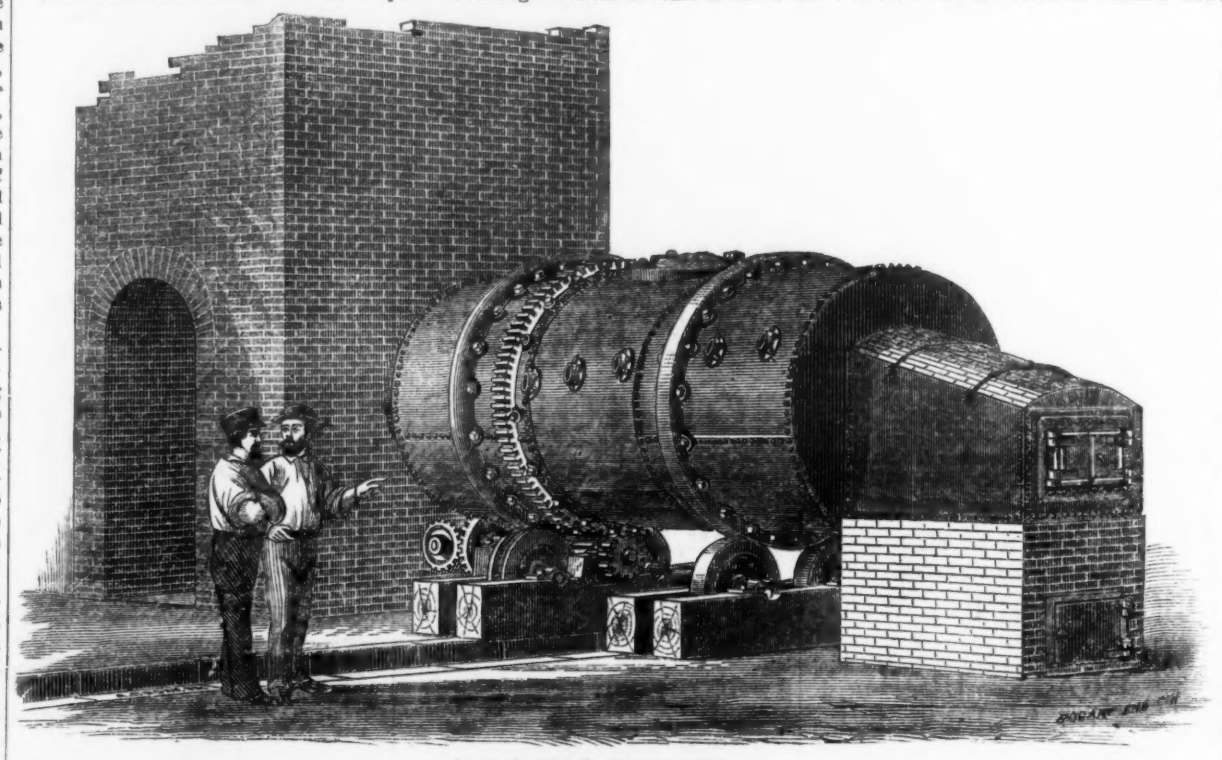
We show in the accompanying illustrations an elevation (Fig. 1) longitudinal section (Fig. 2), and transverse section (Fig. 3), of Bruckner's furnace for desulphurizing ores, built by Messrs. Lane & Bodley, of Cincinnati:

The exterior of the cylinder is a sheet of boiler iron, 12 feet long by 5 feet 6 inches in diameter. The ends are partially closed with similar material, leaving in the centre a circular opening about 2 feet in diameter, bounded by a flange projecting several inches. Upon one side is placed an opening closed by a hinged door. Upon the outside of the cylinder are bolted three bands, as shown in Fig. 1, in which the section of the first is square, and that of the third semi-circular; the second, or middle band, is a strong spur gear. Passing through the cylinder are six pipes parallel to one another, in a plane at an angle of 15° to the axis of the cylinder; these pipes also lie in this plane at an angle of 30 to 35°, to the longitudinal axis of the plane, as shown in Fig. 3, where the internal arrangement of the cylinder is seen, a perforated diaphragm being formed through part of the cylinder by means of perforated plates placed between the above described pipes, the plates being held in place by longitudinal grooves upon these pipes.

The entire cylinder is lined with brick (common building bricks have been found to answer the purpose very well), the brick being placed in the following manner: The entire side of the cylinder is covered with one layer, laid flatwise, thus forming a lining about 2½ inches thick; there is an additional layer extending from each end of the cylinder about 15 inches to the center of where the nearest pipe passes out; the additional concentric layers are added thereon, until the circle is contracted down to the size of the opening in the end, which is also lined, and each layer falls short of the preceding one about 2 inches, thus giving the end linings a conical form, the entire lining being laid in a mortar of one part fire clay, two parts pulverized old fire brick, and water, all thoroughly mixed and beaten. The cylinder is supported upon four large friction rollers, two of which are grooved upon their periphery, to loosely fit the semi-circular band, thus holding the cylinder longitudinally in place. The other two friction rollers are made without a groove, and bear upon the square band, thus accommodating themselves to the expansion and contraction of the cylinder, or any irregularities of form, all of which can be seen in Fig. 1. Rotary motion is given to the cylinder by means of a pinion placed under the cylinder and gearing into the spur-gear band. Upon the other end of the pinion shaft are placed two bevel wheels, into which gear two match wheels, which latter are loose upon the driving shaft, standing at right angles to the pinion shaft, and either of which wheels can be attached to the driving shaft, thus communicating the speed of revolution of one or the other of the bevel gear as may be desired. Inasmuch as by wear or settling the axis of the cylinder may possibly be thrown out of the proper line, the following means of adjustment are provided, but not shown in any of the figures, viz., each journal box of the friction rollers is held in position by adjusting screws, by which it can be moved horizontally to or from the center line of the machine, thus giving entire control to the lateral and perpendicular adjustment of the cylinder which they support.

The circular flange of one end of the cylinder loosely projects into a fire box, best seen in section to the left of Fig. 2. The other end projects into an opening communicating with dust chambers and a chimney. There is placed in the bottom of the flue a shoe projecting into the cylinder, which catches such dust as may fall back, and returns it into the cylinder in lieu of allowing it to escape through the crevice between the cylinder flange and opening into the flue. A door is placed in the flue opposite the opening, through which the interior of the cylinder and its contents can be readily examined at any time.

The line shaft should run 23 revolutions per minute. Three horse-power is required to drive the furnace. The mechanical details of the furnace are very well worked out, and will repay careful study by those who are interested in the use of revolving furnaces of any kind. In this respect many furnaces which have been presented to the public have failed, for, while correct in principle, the practical details have been treated in such an ignorant, unmechanical fashion as to preclude the possibility of successful use.



THE BRUCKNER REVOLVING FURNACE.

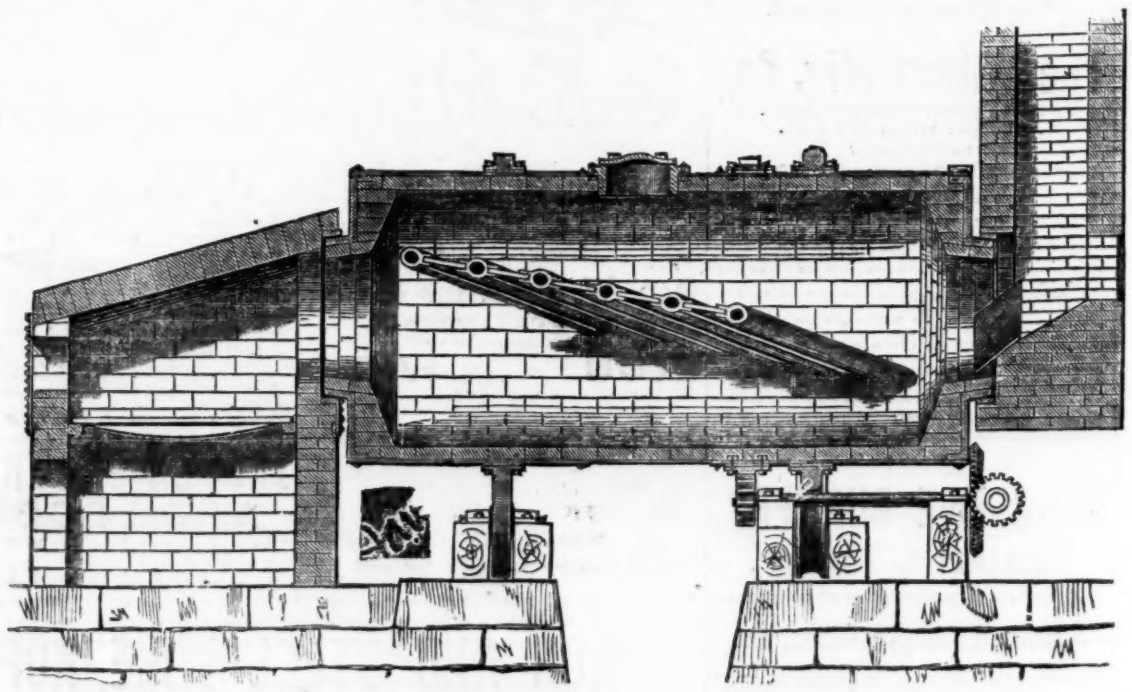


Fig. 2.

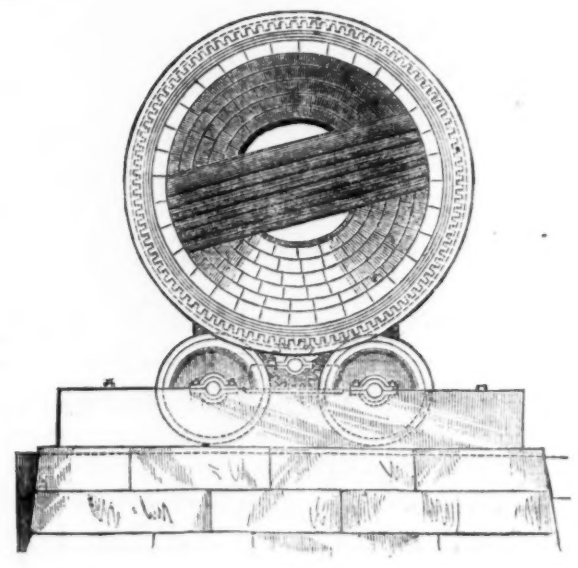


Fig. 3.

North of England Blast Furnaces.

The London *Daily News* says: Roughly speaking, it may be said that a third of the blast furnaces in the Cleveland iron masters' district are out of blast, that in West Cumberland a larger proportion is similarly idle, and that in the Barrow district a similar state of affairs prevails. In the first and most important of these districts the highest authority in the iron trade has described the state of affairs as "calamitous," and every week fresh additions are made to the list of Northern iron works laid idle, and every week the distress amongst iron workers seems increasing. At Glaisdale and West Hartlepool all the blast furnaces are off work; at Newport on the Tees the bulk are unemployed; and from Eston to Consett every center of the iron trade sees many of these huge ore smelters laid idle. The consequences are patent to those in the iron districts who know the hundreds of men that each blast furnace gives direct and indirect employment to in mining for ore and coal, in the quarrying of limestone, and in the work of preparing these raw materials. It may not now be uninteresting to attempt to give an idea of the work done by these furnaces, and of the great growth in the North, of which they are the indices.

Confining ourselves to what is called the Cleveland district, it may be said that the first were those erected at Witton Park in 1846, by Messrs. Bolckow & Vaughan, but these were solitary for years, and the first really in the bounds of Cleveland were built at Middlesbrough in 1852, by the same firm, after the commercial discovery of the Cleveland iron ore. They attained then the hight of only 42 feet, but these have been rebuilt, and by successive stages the hight has been increased until the latest blown in at the Northern confines of the district have attained the hight of 103 feet, and are described as the largest in the world. Similarly the dimensions of the "bosh" have been increased more than double. In the first furnaces referred to, this (which is roughly described as the lower of the two truncated cones of which the furnace consists) was under 14 feet, but now the largest furnaces have a bosh of 31 feet. There has been a consequential increase of the cubical capacity—the earliest having a capacity of 4590 feet, and the latest nearly ten times that amount. As to the primary cost of furnaces, it may be added that two of medium size, exclusive of land, cost £53,331, and that in the 150 in the Cleveland district above three millions sterling are sunk. As the result of this, the district now produces six million tons of iron ore yearly, and there are produced now two million tons of pig iron, where two dozen years ago the industry was non-existent. That production was estimated at £10,000,000, but the owners know to their cost that the value is a fluctuating one.

It may be added that the inner part of these furnaces is of fire brick, and that a thick covering of brickwork, or masonry, bound with belts of stout iron, forms the outer casing. Each requires a continous supply of iron ore, coke and lime; and an average furnace takes daily some two hundred tons of ore, previously kiln-roasted into about 150 tons of calcined iron; 150 tons of coal, baked into little more than half that weight of coke; 35 tons of limestone as a flux, and huge quantities of air. Thus duly supplied with properly roasted ore, well baked coke, and pure lime, it gives out at intervals quantities of iron, which throw off, in Mushet's words, "an infinite number of brilliant sparkles of carbon," whilst slag comes regularly from it in a continuous hot stream of light color. But let the conditions be uncomplied with, and the furnace tenders know that trouble is before them. With raw ore, doughy coke or impure limestone, or with air unwarmed by passing through a respirator like furnace, the symptoms are like those of indigestion, and, as a Cleveland iron master phrases it, the blast furnace "begins to heave, to kick, to spit fire." Ore, coke and lime are refused for a time, then gulped in double quick, and possibly "floods of black, discolored slag" issue, or nothing is given out at all; and in extreme cases, in spite of all exertion, the furnace comes to an untimely end. All working well, rows of parallel trenches are molded in the sand, connected with each other; and, duly tapped, the furnace gives out a molten stream into these, where it takes the form well known as pig iron.

It seems a simple operation to have largely changed the face of Cleveland, but it is the transforming of the long hidden resources of the Cleveland hills into a shape in which they meet the varying and ever growing needs of commerce. Year by year fresh fields have been literally given up to this iron manufacture, until it is literally true that a large part of Cleveland is being undermined in the search for ore, and new sites are sought for furnaces. At first they were confined to the banks of the Tees; then at Darlington, into the remote Esk Valley at Grosmont and Glaisdale, at the Tees mouth, and on the Cleveland coast as far as Skinningrove, as well as at remoter points in Durham, these have been planted. By their growth at the rate of more than six annually, a trade has been developed which has in a score of years revolutionized the whole district, and made a city of the solitude. By the disuse of a third of the number and of the corallaries thereto, the vast district from Esk to Tyne is suffering keen pangs of distress, relieved only by the hope of a better day being ushered in through the media of cheaper iron, labor and coal in the new year.

There was recently launched at Baltimore, for the United States Coast Survey, a "composito" vessel, that is a vessel built partly of iron and partly of wood. It appears that this vessel was built upon recommendation of Captain Patterson, of the coast survey, whose views on the subject are of interest in adding to our knowledge of the important questions affecting the shipbuilding trade. He says that experience has shown "composito" vessels to be more economical and more durable than vessels built either entirely of iron or entirely of wood, and that this is more especially the case in our Southern waters. In the "composito" hull, the frame and beams are of iron and the planking of wood. The waters of the Southern coast are found to seriously affect iron hulls, so that after about eight years the iron *falls*. Five or six years ago two small "composito" vessels were built for the coast survey, in Baltimore, and they have proved very successful; one of these, the Bibb, withstood the terrible cyclone which recently destroyed Indianola. She was subject to its full severity for 90 hours, but passed through it unscathed. In the period of nearly six years that they have been afloat, the repairs to these two schooners have not exceeded $600. Subsequently another "composito" schooner, of 125 tons, was built, and afterward a "composito" steamer, of 200 tons. Captain Patterson thinks that this class of vessels will in time be generally used, on account of their much greater durability than wooden vessels, which much more than balances the somewhat heavier first cost.

Messrs. M. D. Leggett & Co. have just received notification of an allowance of the claims of Mr. J. Ostrander, for a patent on his invention for rolling tubular iron. By this invention tubing can be rolled, with a compound mandril, 30 feet long of required diameter or shape and with a hole from one-sixteenth inch to any required size. Mr. Ostrander's method has ceased to be a mere experiment, as tube iron is now being manufactured, under former patents granted him, at the Israel James Iron Works, Cuyahoga Falls. The iron manufactured after this patent is intended for all purposes where iron tubing can be used, notably for stay bolts for boilers, hollow pump plungers, and hollow working bands for oil wells.—*Cleveland Trade Review.*

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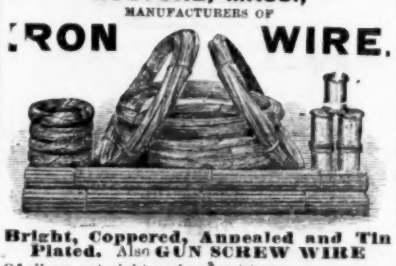

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Comparative Value of Iron Ores.

We take the following from the *Bulletin of the Iron and Steel Association*:

SIR: During the year 1872–73, while iron was bringing exceedingly high prices, being engaged in the manufacture of pig iron from magnetic ores, I had my attention frequently called to the large quantity of inferior ore that was being mined and sold at high figures. Much of the ore contained a large proportion of rock and dirt, which could easily have been thrown out by a little care in sorting and shipping. It requires no lengthy argument to prove the bad policy of transporting, melting and fluxing such large quantities of unproductive material, but for my own convenience in selecting ores, I arranged a scale showing approximately the relative economy of using ores of different richness at the then prevailing prices.

The rocky impurities contained in the ores of this region are the constituent minerals of a syenitic gneiss, the quartz often largely predominating, and sometimes the hornblende, feldspar, or mica, the chief impurity in most cases, however, being silica. In all the ores herein considered, however much the amount of gangue may differ in the respective ores, the relative proportions of silica, lime, alumina and magnesia are maintained the same, and in order to make the comparison as fair as possible these proportions were assumed at what was thought to be about the average composition of the gangue of the ores of this region. Ore yielding 60 per cent. metallic iron was assumed to have the following composition:

Magnetic oxide of iron	82·87
Silica	10·00
Lime	1·71
Alumina	2·30
Magnesia	0·32
Sulphur	0·30
Phosphoric acid	0·50
Mechanical moisture, &c	2·00
Total	100·00

The flux used was a dolomitic limestone containing:

Silica	8·06
Alumina and sesquioxide of iron	1·12
Lime	29·09
Magnesia	18·57
Carbonic acid	43·16
Total	100·00

The fuel was anthracite of the following composition:

Fixed carbon	91·50		
Vol. mat., sulphur and moisture	1·50		
Ash	7·00	Silica	3·04
		Alumina and sesquioxide of iron	3·10
		Lime	0·06
Total	100·00		

On the basis of prices which prevailed in 1872–'73, it was assumed that the labor and superintendence of the furnace cost $750 per week; the repairs, miscellaneous supplies and incidental expenses, $250 per week; the coal, $5·50 per ton; the limestone, $1·30 per ton; 60 per cent. ore to be selling at $9 per ton; 55 per cent. ore at $8; 50 per cent. ore at $7; 45 per cent. ore at $6; 40 per cent. ore at $5; and the average weekly ore consumption of the furnace to amount to 500 tons. The amount of coal used per ton of pig iron produced was made up from our practical experience with ores of different richness and the quantity of limestone calculated in each case for the formation of a basic slag containing 38 to 40 per cent. of silice, approximating the formula $R_2O_3SiO_3+2(3RO, SiO_3)$. The furnace is supposed to be running on 1X and 2X iron, and the temperature of the blast to be 800° Fah.

Under the above conditions, the manufacture of pig iron showed in 1872–73 the following results.

Cost with 60 per cent. ore.—Ore consumed by furnace per week, 500 tons. Pig iron produced, 300 tons.

	Tons.		
Ore used to ton of iron made	1·67	at $5·50 =	$9·18
Limestone " "	·60	at 1·30 =	0·78
Coal " "	1·30	at 5·50 =	7·15
Labor, " "			2·50
Incidentals, " "			0·77
Total cost			$26·23

Cost of iron made with 55 per cent. ore.—Ore consumption per week, 500 tons. Pig iron produced, 275 tons.

	Tons.		
Ore used to ton of iron made	1·81	at $4·80 =	$8·68
Limestone, " "	·96	at 1·30 =	1·12
Coal, " "	1·425	at 5·50 =	7·83
Labor, " "			2·73
Incidentals, " "			0·81
Total cost,			$27·00

Cost of iron made with 50 per cent. ore.—Ore consumption per week, 500 tons. Pig iron produced, 250 tons.

	Tons.		
Ore used to ton of iron made	2	at $7·00 =	$14·00
Limestone " "	1·16	at 1·30 =	1·51
Coal " "	1·55	at 5·50 =	8·53
Labor " "			3·00
Incidentals " "			0·92
Total cost			$27·96

Cost of iron made with 45 per cent. ore.—Ore consumed per week, 500 tons. Pig iron produced, 225 tons.

	Tons.		
Ore used to ton of iron made	2·23	at $6·00 =	$13·38
Limestone " "	1·54	at 1·30 =	1·95
Coal " "	1·675	at 5·50 =	9·21
Labor " "			3·34
Incidentals " "			1·03
Total cost			$28·91

Cost of iron made with 40 per cent. ore.—Ore consumption, 500 tons per week. Pig iron produced, 200 tons.

	Tons.		
Ore used per ton of iron made	2·50	at $5·00 =	$12·50
Coal " "	1·80	at 5·50 =	9·90
Limestone " "	1·80	at 1·30 =	2·34
Labor " "			3·75
Incidentals " "			1·15
Total cost			$29·64

The above results showed the great importance of thoroughly cleaning ore at the mine before shipping, and indicated very clearly that the richer ores were very much cheaper at the ruling prices than the lean ones. Assuming that 60 per cent. ore can now be had for $5·50 at the furnace, I find that in order to make equally cheap iron with 55 per cent. ore the ore should not cost more than $4·50 per ton; 50 per cent. ore must cost $3·53; 45 per cent. ore, $2·63, and 40 per cent. ore, $1·81, as is shown by the following calculations. It is taken for granted that labor has declined 40 per cent. since 1872–3; limestone, 25 per cent., and incidental expenses and miscellaneous supplies, 30 per cent.

Cost with 60 per cent. ore.—Ore consumed per week, 500 tons. Pig iron produced, 300 tons.

	Tons.		
Ore used to ton of iron made	1·67	at $5·50 =	$9·18
Limestone " "	·64	at 1·09 =	0·69
Coal " "	1·30	at 4·70 =	6·11
Labor " "			1·50
Incidentals " "			0·55
Total cost			$17·94

Cost with 55 per cent. ore.—Ore consumed per week, 500 tons. Pig iron produced, 300 tons.

	Tons.		
Ore used to ton of iron made	1·81	at $4·70 =	$8·14
Limestone " "	·86	at 1·09 =	0·86
Coal " "	1·425	at 4·70 =	6·70
Labor " "			1·64
Incidentals " "			0·60
Total cost			$17·94

Cost with 50 per cent. ore.—Ore consumed per week, 500 tons. Pig iron produced, 250 tons:

	Tons.		
Ore used to ton of iron made	2	at $3·53 =	$7·06
Coal " "	1·55	at 4·70 =	7·28
Limestone " "	1·16	at 1·09 =	1·16
Labor " "			1·80
Incidentals " "			0·65
Total cost			$17·95

Cost with 45 per cent. ore.—Ore consumed per week, 500 tons. Pig iron produced, 225 tons:

	Tons.		
Ore used to ton of iron made	2·23	at $2·63 =	$5·87
Coal " "	1·675	at 4·70 =	7·87
Limestone " "	1·50	at 1·09 =	1·50
Labor " "			2·00
Incidentals " "			0·70
Total cost			$17·94

Cost with 40 per cent. ore.—Ore consumed per week, 500 tons. Pig iron produced, 200 tons.

	Tons.		
Ore used to ton of iron made	2·50	at $1·81 =	$4·53
Coal " "	1·80	at 4·70 =	8·46
Limestone " "	1·80	at 1·09 =	1·80
Labor " "			2·35
Incidentals " "			0·80
Total cost			$17·94

The precise method here given for estimating the relative value of ores is necessarily of somewhat limited application, as there are many things which may modify the calculations. With ores of a different character, and with the furnace in another locality, the results might differ very materially from those which I have given. MANAGER.

Depreciation in the Value of Boston Real Estate.

The Boston *Herald* believes that overbuilding has caused the reduction of rents in that city. It says: "In the matter of dwellings Boston was largely overbuilt, though perhaps if the tide of prosperity had not ebbed so soon, the surplus houses might find occupants in the course of time. But the most remarkable, as well as the most rational and excusable instances of over-building, occurred in the reconstruction of our burnt district. The structures erected are acknowledged to be inferior to none in the country, but their scale and grandeur have been so augmented as to increase the capacity of the area over its former condition from 50 to 100 per cent. The effect of this is beginning to be felt in many other portions of the city, particularly in the vicinity of State, Commercial and Broad streets. Since their completion a considerable number of the new buildings on the burnt district have remained untenanted principally because the scale of rents demanded for them was greater than prudence and hard times combined would allow business men to pay. Indeed, many of those who had taken buildings on this district found out some time ago that hey were paying more than they could affordt to, and their landlords were made to understand this in unmistakable terms. The alternative was presented them of taking a less rate of rent or losing their tenants altogether, and they generally acquiesced in a reduced rate as a sort of temporary war measure. It is said that one large concern that paid a yearly rent of $30,000 has of late been allowed to continue at a rate of $15,000 per year. The landlord considered it better to make this compromise than to have his tenants move out—as they would be forced to do rather than pay a rent not warranted by their business—and have his premises long idle on his hands, or perhaps, if a tenant were found, to be compelled to refit them for a new business at a large expense. Within the past year, then, made wise and moderate by the experience of others, the owners of unoccupied estates in the burnt district have been adopting a policy of attracting business settlement of all kinds by the offer of superior accommodations and very much lower rates of rent than were paid by the parties in their old places of business. The effect of this policy is that the burnt district is gradually filling up, and empty stores, offices, and even buildings, in the older business localities are to be encountered on every hand. Banks, insurance offices, and even brokers, are turning their backs upon State street, and the glory of this great commercial center threatens to depart, and seek more congenial shades amid the palaces of trade and life insurance south of Post Office Square. The rates of rents rule extremely low. Twelve months ago there were grumbling and apprehension at the rates then ruling, and it was supposed the hardest kind of "hard pan" had been reached. But the inexorable trade law of supply and demand—which affects alike the starvation wages of the poor man and the lightest returns on investments of the millionaire—has operated to still further depress rates, the supply being greater than the demand, and as a result we find rates of rent now very much lower than they were even a year ago. Some landlords feel very blue over the prospect, and accept with an ill grace the inevitable. Some owners of large business apartments are said to be eagerly leasing at rates that, when their buildings are all occupied, will not yield over 2 per cent. on the money invested in their erection.

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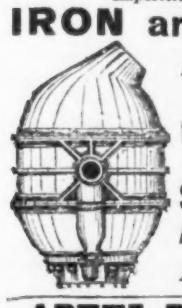
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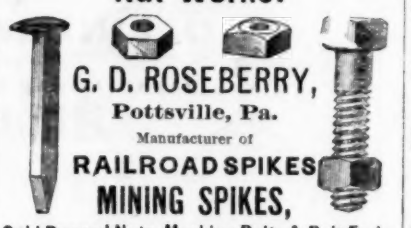
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Improved Screw Cutting Die and Holder.

In the accompanying illustrations we show an improvement in screw cutting dies, made by the Wiley & Russell Manufacturing Company, of Greenfield, Mass. This tool is made so as to be conveniently held in a bit stock instead of in the ordinary plate. The construction will readily be understood from Fig. 1, and also from the representation of the die taken apart in Fig. 2. The screws shown at A, in Fig. 1, serve to close the parts of the die

IMPROVED SCREW CUTTING DIE AND HOLDER.—*Fig.* 1.

together from the sides, and the taper screws, B, Fig. 2, spread the die when driven in, thus regulating the size of the cut. By operating either screws, A or B, the portions of the die may be adjusted and held with great nicety, while wear, at the same time, is compensated for in a very simple and effective manner.

The die does its work in a single cut, thus forming the screw thread at once, neatly and

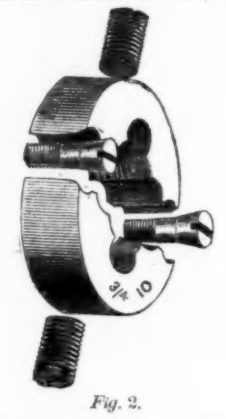


Fig. 2.

sharply, and without raising the thread above the normal surface of the material operated upon. The die also allows of nuts and bolts for different purposes being made to fit together tightly or loosely, as desired.

This tool is particularly intended for threading stove rods rapidly and accurately, and will be useful also to carriage makers and in jobbing shops on rods three-eighths and under.

New Patents.

We take from the records of the Patent Office at Washington the following specifications of certain patents, lately issued, which will be found interesting:

IMPROVEMENT IN THE MANUFACTURE OF CASTINGS FROM WROUGHT AND CAST IRON.

Specification forming part of Letters Patent No. 169,261, dated Oct. 26, 1875, issued to William Hainsworth, of Pittsburgh, Pennsylvania.

Many articles required in the arts can be made much cheaper of cast iron than of wrought iron, but which, for practical purposes, must have, to a greater or less degree, the properties of wrought iron. By this improvement such articles are made by the operation of casting, and there is secured in the product most or all of the desired properties of wrought iron, or, in other words, they are wrought iron castings.

In carrying out the process first mix together and melt wrought iron and cast iron, varying the proportions somewhat according to the quality of the materials employed, increasing or lessening the precentage of wrought iron according as the pig iron contains a high or low percentage of carbon, or according as a greater or less degree of malleability and toughness is desired in the product. With ordinary materials, and for ordinary purposes, about equal proportions of wrought and cast iron may be employed, varying from this, or even a little less than one-half of wrought iron, to 10 or 20 per centum of an excess of wrought iron. The melting may be done in any suitable furnace or crucible, and other ingredients may be added, if so desired. For convenience in mixing and melting the materials may be reduced to comparatively small pieces. As soon as the mixture is melted run it off into pigs in the manner well known in similar operations. This is done partly because the iron needs still further refining before answering perfectly for the uses in view, and partly because it is not sufficiently homogeneous. Then break up the pigs and remelt them in crucibles, or in an open hearth or other suitable furnace, and as soon as melted run off into the molds suitable for making the article or articles desired. Any kind of molds, such as are employed in ordinary foundry work, may be used. The remelting has a refining effect on the iron, and also gives it a more homogeneous character; and the production may be still further refined by adding a small percentage of wrought iron—say, five to ten per centum—in the second melting. In this manner is secured after annealing a cast product which has all, or nearly all, the desirable properties of ordinary wrought iron. It is tough, strong, malleable and ductile.

Claim.—The process of making homogeneous refined castings from wrought and cast iron, by first mixing and melting wrought and cast iron in about the proportions specified; second, running the molten mixture off into pigs; third, breaking up and remelting the pigs; and, fourth, running the remelted product off into molds.

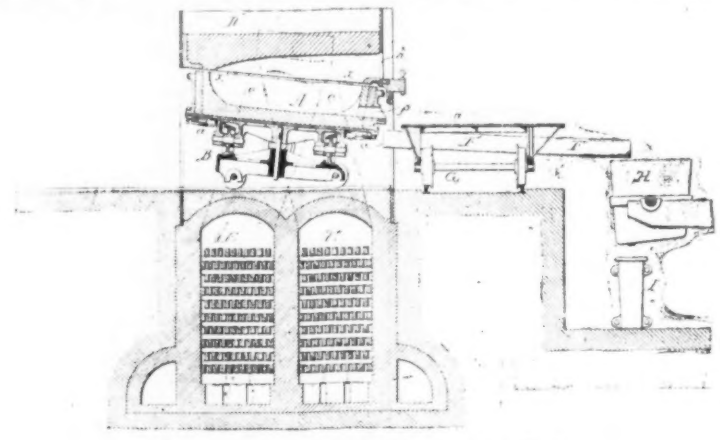
IMPROVEMENT IN INCLINED REVOLVING PUDDLING FURNACES.

Specification forming part of Letters Patent No. 169,033, dated October 19, 1875, issued to Charles Pernot, of St. Chamond, France.

The object of this invention is to improve the construction of converting furnaces having inclined and removable hearths A, arranged as shown in the drawing.

The hearth or receiver A is mounted in an inclined position on a truck, B, on which it can be freely rotated, the said truck being adapted to a railway track, upon which it can, together with the receiver, be withdrawn laterally from the furnace.

The receiver has on its under side a cog-wheel, *a*, into which gears a pinion, *b*, on an inclined shaft, *d* (shown in Fig. 2), the said shaft being operated, by any suitable means, in such a manner as to impart a continuous rotary movement to the inclined hearth, and in such a manner, also, that the speed can be increased or diminished at will.



INCLINED REVOLVING PUDDLING FURNACE.—*Fig.* 1.

In order to avoid the necessity of packing the joint *x* between the receiver and the furnace D, there is employed for heating the furnace a system of regenerators, E, similar to those of a Siemens furnace, in which the internal pressure exceeds that of the external air. The joint *x*, therefore, may be left open, without any packing, the internal pressure effectually preventing the access of external air to the contents of the furnace.

While a packing round a rotary hearth is always objectionable, and generally inefficient, it is specially so where, as in this instance, the hearth is to be withdrawn from the furnace from time to time.

The receiver has a tapping hole, *f*, for discharging the molten steel into an inclined spout, F, on a truck, G, which can be wheeled to different points, in order to be brought opposite ladles H, from which the metal is poured into ingot-molds I. The truck G is also constructed with a platform, *g*, above the spout, upon which the attendants can stand when charging the receiver A, or while engaged at the working-hole *h*.

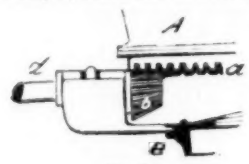


Fig. 2

The molten cast iron, by the action of the rotating hearth A, is thrown outward and upward by centrifugal force, and falls again toward the center in small particles, so that the whole of the mass is acted on by the gases, oxidation rapidly takes place, and the required proportion of carbon is dissipated, the result being a perfectly homogeneous steel.

Claim.—1. A furnace in which are combined an inclined rotating and removable hearth, arranged to leave an open joint, *x*, between the hearth and the body of the furnace, and a regenerator, from which heated gases are passed to the furnace under a pressure greater than that of the external atmosphere.

2. The combination of the furnace D, inclined rotary hearth A, series of ladles H and spout F, mounted on a truck, G, to conduct the molten metal to any one of the ladles.

Those who go down to the sea in ships from San Francisco, whether trans-oceanic or coast-wise, appear to run risks hazarded by passengers from no other part. Fragments of the ill-fated Pacific's timbers have been cast ashore at several points, and were found to be affected with dry rot to such an extent that they fell to pieces on being handled. In one instance a piece of sound wood had been fastened to a rotten timber with a bolt eaten away with rust. The Los Angeles has fortunately turned up safe with her hundred passengers, but she is stated to be so rotten that she can hardly float. She was originally a government cutter, the Wawayanda, but when her timbers decayed so that she was unsafe, the United States sold her to be converted into a passenger vessel. Goodall, Nelson & Perkins, owners of this tub, the Pacific and the Salvador, whose fleet must have been a thing of beauty and a joy forever to the coroners along the coast, announce, somewhat late in the day, their intention of withdrawing their steamers. Ten vessels and 1500 lives represent the losses from the single port of San Francisco during the past five years. A pathetic and singular incident of the wreck has been, by the way, the discovery of the body of Miss Fannie Palmer, of San Juan Island. She was drowned on the vessel, but the waves carried her body a distance of 150 miles and cast it up on the beach within sight of her parents' house.

Bridge Building in a Hurry.

When the old market street bridge over the Schuylkill was burned in November last it was regarded as a peculiarly serious mishap. It was on the line of the main thoroughfare of the city, not only connecting West Philadelphia residents with the city proper, but bringing passengers and merchandise to and from the depots of the Pennsylvania Railroad and all its many connections. But more important even than this was the fact that it was the most natural and direct route to the Centennial grounds. The loss of the bridge was not an inconvenience merely; it was a positive danger, menacing the success of the Centennial Exhibition itself. Philadelphians were accordingly in despair. The time honored old bridge had taken years to finish, and the great exhibition was only six months distant. The mayor issued a proclamation while the flames were still raging, the city council held special meetings, consultations of engineers took place, and there was endless talk but no solution of the problem of how to do the work in time, where to get the large sum of money and whom to find to do it. But Mr. Thomas A. Scott, president of the Pennsylvania Railroad, dropped in at the mayor's office one day and said: "See here, I'll build you a strong bridge, with double the capacity of the old one. It shall cost $65,000, $10,000 less than the insurance on the burned bridge; I'll sell it to the city for cost price exactly; I'll return every cent. less than $55,000 that it costs, and I'll guarantee to have it done by the 1st of January."

When the city authorities had recovered breath this bold proposition was accepted. Mr. Scott had anticipated their acceptance by telegraphing all over the lumber country of Pennsylvania as soon as he made his proposition, ordering the bridge timber to be immediately cut and loaded upon cars to await orders. The instant the contract was signed he sent dispatches ordering that these cars be attached to lightning express trains and whirled toward Philadelphia. Before Mr. Scott's proposition had been officially received everything was ready. About 150 men stood with saws, hammers and spikes in their hands on the banks of the river at the site of the old bridge, waiting for the ordinance to pass, ready to strike the first blow the moment the signal was given. It was toward evening on the 5th of December when the contract was signed, and work was begun without an instant's delay and kept up all that night. By daylight and by torches and calcium lights, Sundays and week days, in fair weather and storm, without an hour's intermission, the bridge building was carried on under the direction of Mr. William J. Lockhard, division superintendent of the railroad. Three hours less than 21 days from the time the mayor signed the ordinance, or seven days ahead of time, the bridge was finished and formally opened to travel. The men who had been engaged upon it were then treated to a Christmas dinner at the railroad depot in West Philadelphia, and will be permitted to take a well earned rest during the holidays. The bridge is a Howe truss, well constructed of white pine, with a flooring of oak, the timbers having been shipped from Harrisburg, Wrightsville, Hunt's Run and St. Mary. The structure is 540 feet long, the two end spans being each 162 feet, and the centre span 216 feet in length. The truss is 25 feet high in the clear and 28 feet from out to out. The width of the bridge is 48 feet, including the sidewalk, which is 10 feet wide. The railroad bridge which is to be constructed on the abutments north of the present structure will be 24 feet wide in the clear and 28 feet from out to out. The work of constructing this portion of the bridge will be begun after the Christmas holidays, and upon its completion the temporary railroad bridge over which the cars of the Pennsylvania road now pass will be removed and the river once more opened to navigation at that point. In order to increase the facility for travel over the new bridge an extension was made on the south end of the old piers through substantial wrought iron columns firmly secured in the old masonry at the water line and to the pier, filled in with masonry between the end of the pier and the column.

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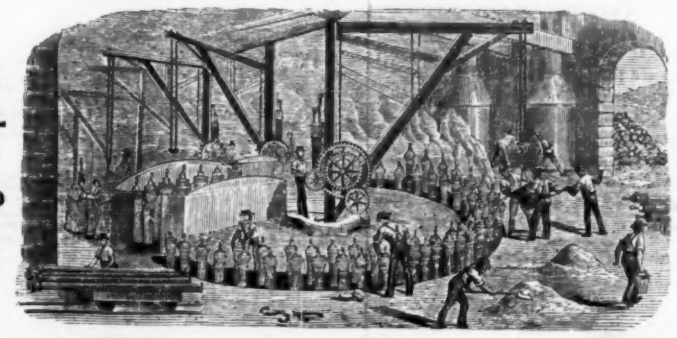

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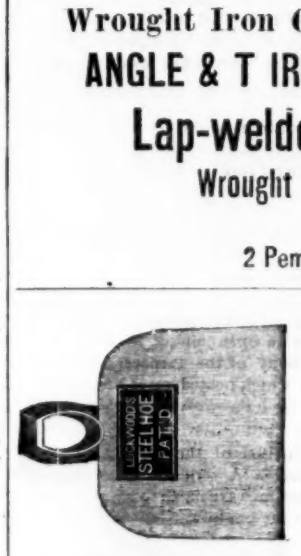

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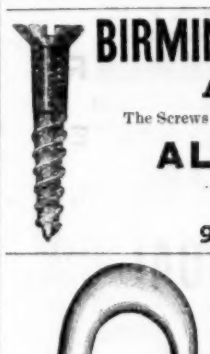

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Pumps.

(Continued).

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IRON PUMPS FOR OUT-DOOR WORK,

which are more generally used than any other apparatus for raising water. One of the prime essentials for an out-door pump is, that the brake shall be long enough and the barrel high enough, so that it may be worked by a person of common hight, standing. When the barrel of the pump is above ground, however, there was always danger of freezing in cold weather, and the first great improvement in this class of pumps consisted in sinking the working parts below the surface. Up to that time pumps of this class had been of the ordinary suction pump pattern, the water flowing immediately from the piston out of the spout. We now have three classes of pumps; lift, lift and suction, and suction and force. In the lift pump the barrel and lower valve are carried down below the surface of the water, the upward stroke of the piston carrying up the water raised without the aid of atmospheric pressure. This form of pump is much used, especially in driven wells. The working parts are perfectly protected from frost, they are simple and strong, and may be removed without trouble. The lower cylinder is made very compact in form, so as to go into the bore of a driven well, and is commonly provided with a strainer of some sort, which is screwed upon the end. When the cylinder is not long enough to reach the water level, a length of suction pipe is attached, and the pump then sucks as well as lifts. The capacity of such a pump is about the same as that of a cistern pump of the same diameter lifting water the same distance, ranging from 8 to 26 gallons per minute. In the more perfect form it is so arranged as to allow the water to run back, when desired, to prevent freezing, the brake stand swivels so as to make it either a right hand or a left hand pump, and by adding to the wrought iron set length and piston rod, it is adapted for use in wells of almost any depth. When the well is very deep, however, it may be necessary to increase the leverage by lengthening the brake, and to counterbalance the added weight, we have the greater weight of the piston rod and column of water. It is frequently an advantage in deep wells to use a strainer provided with an iron nest, which projects far enough to be firmly imbedded in the earth at the bottom of the well. This holds the pipe steady and aids in supporting it. Pipes in deep wells should be well braced, as the jarring and hammering of the brake is usually great enough to rack a long line of pipe, loosen the connections and necessitate frequent repairs. In light, sandy soil, cisterns, dug wells, and in any situation where there is danger of drawing dirt into the pipe, and where there is room enough to use a large strainer, the so-called "Mushroom" strainer presents many advantages. This strainer is of the saucer shape, and the water enters it at the top, while that which runs back from the barrel when the valve is tripped, flows out of the strainer in an upward direction, thus preventing the roiling of the water by stirring up the mud and sand on the bottom.

The lift and force pump differs from the lift and the suction and lift pumps in an arrangement of parts by which the water is ejected from the cylinder under pressure great enough to carry it beyond the point at which power is is applied. As adapted to ordinary work, force pumps are always piston pumps, arranged with an air chamber to equalize the pressure and afford a constant stream, instead of an intermittent one, which, by its action, might seriously strain the pipe. The force pump is the one which, in cities, is most frequently used, since it is not only able to lift water above the point at which power is applied, but to send it in any direction, and to almost any distance. They are largely used for raising water to tanks on the upper floors of houses supplied from mains in which the pressure is not great enough to give the required head. These pumps usually require more power for a given lift than any other, owing to the greater friction of parts. There are one or two hand-force pumps, however, in which the internal friction is but little, if any, greater than in the most efficient lift pumps. The efficiency of the best of these pumps, provided with an air chamber and worked with sufficient power, may be averaged as follows:

Size of Bore.	Size of Pipe.	Gals. per Minute.
2 in.	0¾ in.	6
2¼ "	0¾ "	9
2½ "	1 "	12
2¾ "	1¼ "	15
3 "	1½ "	22
3½ "	2 "	30

The efficiency of a pump without an air chamber will be somewhat less than this, as it might be found difficult under certain circumstances to work the pump to its capacity. The power necessary to obtain this efficiency depends, of course, upon the hight to which the water has to be forced, as well as the distance. When one of the larger sizes is employed for raising water to a great hight, one man would probably be unable to work the pump to its capacity. The force pumps of all leading manufacturers are able to do this amount of work. The amount of power required, of course, depends upon circumstances. When the pump is continually supplied with all the water it can take, the amount of power required will be at a minimum, and the pump will be able to work up to its full capacity. An air chamber on a small suction pipe is almost a necessity, because it frequently happens, in a city, that the small head of water in the street mains, and the small pipe used to bring water, prevent a sufficient supply from reaching the pump, and consequently the pump does not do half the work of which it is theoretically capable. The addition of an air chamber below the pump keeps a constant stream flowing to the pump, and at the same time acts as a reservoir from which the pump may draw a supply at each stroke. The ordinary water charger or primer used on common suction pumps answers this purpose and adds greatly both to the ease and the capacity of a force pump under the circumstances we have named. Their cost is small, but their utility is very great and will repay the expense and trouble of applying them.

In city houses the pump most used for raising water is a side pump mounted on a plank. These pumps are often sold unmounted. They are very convenient to fasten to the side of a building or partition, as they have side ears, while the suction pipe and lower connection can be got at without disturbing the pump. The brake is usually arranged so as to be right or left hand as may be desired. The parts are commonly all brass. In too many cases they are perhaps without an air chamber. Sizes vary from the small 2½ inch bore, with a capacity of 12 gallons per minute, up to 4½ inch bore, capable of delivering 50 gallons per minute. When a steady and constant stream of water is required to be forced up, and a rapid supply needed, a double acting suction and force pump is used. These pumps deliver water at both upward and downward strokes. A pump with 2¼ inch bore will deliver about 16 gallons per minute; with a 2½ inch bore 24 gallons; 3¼ inch bore 52 gallons; 4½ inch bore 100 gallons per minute. Such pumps when furnished with an air chamber and hose are very effective for throwing a stream of water either for fire purposes or for washing windows, carriages and sprinkling walks. The larger sizes are very heavy and require so much power that a power pump would in many cases be preferable. In putting up pumps of this class large pipes are absolutely necessary, since the waste of power in forcing the large quantity of water, which they deliver through small pipes, is enormous.

When as large a quantity of water as these pumps will throw is to be raised by hand-power, some form of pump with a double brake is commonly used, so that two men can work at the same time.

One of the most common methods of raising water by power is by using the so-called hydraulic ram. The simplicity of operation of the hydraulic ram, its effectiveness and economy, together with the fact that it is applicable in thousands of situations now without water, render a better knowledge of its operation extremely desirable. The following facts in regard to this apparatus will be interesting to most of our readers. The hydraulic ram is decidedly the most important and valuable apparatus yet developed in hydraulics for forcing a portion of a running stream of water to any elevation, proportionate to the fall obtained. It is perfectly applicable where no more than 18 inches fall can be had; yet the greater the fall applied, the more powerful the operation of the machine, and the higher the water may be conveyed. The relative proportions between the water raised, and wasted, is dependent entirely upon the relative hight of the spring or source of supply above the ram, and the elevation to which it is required to be raised—the quantity raised varying in proportion to the hight to which it is conveyed, with a given fall; also, the distance which the water has to be conveyed, and consequent length of pipe has some bearing on the quantity of water raised and discharged by the ram, as the longer the pipe through which the water has to be forced by the machine, the greater the friction to be overcome, and the more the power consumed in the operation; yet it is common to apply the ram for conveying the water distances of one and two hundred rods, and up elevations of one and two hundred feet. Ten feet fall from the spring or brook to the ram is abundantly sufficient for forcing up the water to any elevation under, say, one hundred and fifty feet in hight above the level of the point where the ram is located; and the same ten feet fall will raise the water to a much higher point than above last named, although in a diminished quantity in proportion as the hight is increased. When a sufficient quantity of water is raised with a given fall, it is not advisable to increase said fall, as in so doing the force with which the ram works is increased, and the amount of labor which it has to perform greatly augmented, the wear and tear of the machine proportionably increased, and the durability of the same lessened; so that economy in the expense of keeping the ram in repair would dictate that no greater fall should be applied for propelling the ram than is sufficient to raise a requisite supply of water to the place of use.

To enable any person to make the calculation as to what fall would be sufficient to apply to the ram to raise a sufficient supply of water to his premises, we would say that in conveying it an ordinary distance, of say 50 or 60 rods, it may be safely calculated that about one-seventh part of the water can be raised and discharged at an elevation above the ram, five times as high as the fall which is applied to the ram, or one-fourteenth part can be raised and discharged, say ten times as high as the fall applied; and so in that proportion as the fall or rise is varied. Thus if the ram be placed under a head or fall of five feet, of every 7 gallons drawn from the spring one may be raised 25 feet, or half a gallon 50 feet. Or with ten feet fall applied to the machine, of every 14 gallons drawn from the spring one gallon may be raised to the hight of 100 feet above the machine, and so in like proportions, as the fall or rise is increased or diminished.

The following is an example of what a ram will do when properly set up and with supply, etc., properly proportioned to each other.

The fall from the surface of the water in the spring is 4 feet. The quantity of water delivered, per 10 minutes, at the house, is 8¼ gallons, and that discharged at the ram, 25 gallons. Thus nearly one-seventh part of the water is saved. The perpendicular hight of the place of delivery above the ram is 19 feet, say 15 feet above the surface of the spring. The length of the pipe leading from the ram to the house is 190 feet. The pipe leading from the ram to the house has three right angles, rounded by curves. The length of the drive or supply pipe is 60 feet. Its inner diameter one inch. The depth of water in the spring over the drive pipe is 6 inches. The inner diameter of the pipe conducting the water from the ram to the house is three-eighths of an inch.

It is very essential that the drive or supply pipe should be laid as straight as possible, as in the motion of the water in this pipe consists the power of the ram.

Care should be taken to set the ram in a pit deep enough to protect it from frost, or else by being boxed up the frost should be kept out.

The following table gives the capacity of rams of different sizes, together with the weights and diameters of pipes to be used in connection with them:

Size of Ram.	Quantity of water furnished per minute, by the spring or brook, to which the ram is adapted.	Length of Pipe. Drive.	Length of Pipe. Discharge.	Caliber of Pipes. Drive.	Caliber of Pipes. Discharge.	Weight of Pipe (if of Lead), or if of Wrought Iron, then of ordinary weight.
No. 1	2 gals. to 3 gals. per min.	25 to 50 feet.	100 feet, where desired.	¾ inch.	¾ in.	6 lbs. per yard.
No. 2	3 " " 5 " "	25 to 50 "	100 " "	1 "	¾ "	8 " " "
No. 3	4 " " 7 " "	25 to 50 "	100 " "	1¼ "	1 "	10 " " "
No. 4	6 " " 10 " "	25 to 50 "	100 " "	1½ "	1¼ "	14 lbs. per rod.
No. 5	8 " " 14 " "	25 to 50 "	100 " "	2 "	1½ "	16 " " "
No. 6	12 " " 20 " "	25 to 50 "	100 " "	2½ "	2 "	8 lbs. per yard.
No. 7	20 " " 35 " "	25 to 50 "	100 " "	3 "	2½ "	9 " " "
No. 8	30 " " 50 " "	25 to 50 "	100 " "	3½ "	3 "	11 " " "
No. 10	45 " " 75 " "	25 to 50 "	100 " "	4 "	3½ "	16 lbs. per ft. c. iron.

Drive Pipe for any head or fall not exceeding 10 ft.

Discharge Pipe for Discharge not over 50 feet.

Discharge Pipe for over 50 and not exceeding 100 feet in hight.

If the ram is to be placed under a greater head or fall than named in the above table, it will, of course, be necessary to increase the weight and strength of the drive pipe; also, if the water is to be forced to any greater hight than above mentioned, the discharge pipe should be proportionately increased in weight and strength. Where the water is to be forced to any great distance (say more than 1200 feet), it is preferable to use a discharge pipe of larger caliber than named in the above table.

With a given supply of water under a great fall, the ram is not required to be of a larger size than for the same quantity of water under a less fall. That is, a No. 4 ram would be of sufficient capacity for taking the water from a spring or brook furnishing 7 gallons per minute, where the fall is 8 or 10 feet; if there is not over 3 or 4 feet fall to the same spring or brook, then a No. 5 ram would be better adapted to the place.

If the stream is a large one, and a greater supply of water be required than one of the above sized machines will supply, then increase the number of the machines in preference to having one machine of a larger capacity than above named. Several rams may be set so as to play into one discharge pipe, each ram having a separate drive pipe applied from spring to ram.

The durability of these rams under constant service is quite wonderful. We know of a ram put up in Durham, Conn., in 1847, which had been in constant use up to the time when we last heard of it, in 1873, and which had not cost $5 for repairs, and seemed good for many years more. The drive pipe was 1¼ bore, 40 feet long. The discharge pipe was half inch in diameter and 825 feet long. The water was discharged 85 feet above the ram in a perfectly steady, handsome stream.

Adams & Co., glass manufacturers, Pittsburgh, will before long have their new gas glass melting furnace in operation. This is a recent French invention, and it is claimed that it is much more economical than the coal furnace. The gas is generated from "slack" coal. Furnaces heated in the usual way require the bottom to be renewed every few months, but it is said the bottom of this style of furnace will last for an indefinite time. This will be the first furnace of the kind introduced into Pittsburgh.

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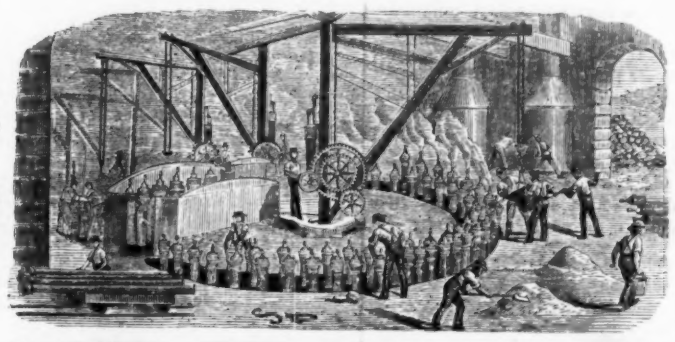

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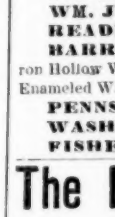

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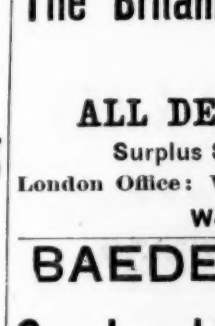

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Pumps.

(Continued)

There are many important varieties of hand pumps, in addition to those considered in the preceding number of this series. In the present issue we shall speak more particularly of

IRON PUMPS FOR OUT-DOOR WORK,

which are more generally used than any other apparatus for raising water. One of the prime essentials for an out-door pump is, that the brake shall be long enough and the barrel high enough, so that it may be worked by a person of common hight, standing. When the barrel of the pump is above ground, however, there was always danger of freezing in cold weather, and the first great improvement in this class of pumps consisted in sinking the working parts below the surface. Up to that time pumps of this class had been of the ordinary suction pump pattern, the water flowing immediately from the piston out of the spout. We now have three classes of pumps; lift, lift and suction, and suction and force. In the lift pump the barrel and lower valve are carried down below the surface of the water, the upward stroke of the piston carrying up the water raised without the aid of atmospheric pressure. This form of pump is much used, especially in driven wells. The working parts are perfectly protected from frost, they are simple and strong, and may be removed without trouble. The lower cylinder is made very compact in form, so as to go into the bore of a driven well, and is commonly provided with a strainer of some sort, which is screwed upon the end. When the cylinder is not long enough to reach the water level, a length of suction pipe is attached, and the pump then sucks as well as lifts. The capacity of such a pump is about the same as that of a cistern pump of the same diameter lifting water the same distance, ranging from 8 to 26 gallons per minute. In the more perfect form it is so arranged as to allow the water to run back, when desired, to prevent freezing, the brake stand swivels so as to make it either a right hand or a left hand pump, and by adding to the wrought iron set length and piston rod, it is adapted for use in wells of almost any depth. When the well is very deep, however, it may be necessary to increase the leverage by lengthening the brake, and to counterbalance the added weight, we have the greater weight of the piston rod and column of water. It is frequently an advantage in deep wells to use a strainer provided with an iron nest, which projects far enough to be firmly imbedded in the earth at the bottom of the well. This holds the pipe steady and aids in supporting it. Pipes in deep wells should be well braced, as the jarring and hammering of the brake is usually great enough to rack a long line of pipe, loosen the connections and necessitate frequent repairs. In light, sandy soil, cisterns, dug wells, and in any situation where there is danger of drawing dirt into the pipe, and where there is room enough to use a large strainer, the so-called "Mushroom" strainer presents many advantages. This strainer is of the saucer shape, and the water enters it at the top, while that which runs back from the barrel when the valve is tripped, flows out of the strainer in an upward direction, thus preventing the rolling of the water by stirring up the mud and sand on the bottom.

The lift and force pump differs from the lift and the suction and lift pumps in an arrangement of parts by which the water is ejected from the cylinder under pressure great enough to carry it beyond the point at which power is is applied. As adapted to ordinary work, force pumps are always piston pumps, arranged with an air chamber to equalize the pressure and afford a constant stream, instead of an intermittent one, which, by its action, might seriously strain the pipe. The force pump is the one which, in cities, is most frequently used, since it is not only able to lift water above the point at which power is applied, but to send it in any direction, and to almost any distance. They are largely used for raising water to tanks on the upper floors of houses supplied from mains in which the pressure is not great enough to give the required head. These pumps usually require more power for a given lift than any other, owing to the greater friction of parts. There are one or two hand-force pumps, however, in which the internal friction is but little, if any, greater than in the most efficient lift pumps. The efficiency of the best of these pumps, provided with an air chamber and worked with sufficient power, may be averaged as follows:

Size of Bore.	Size of Pipe.	Gals. per Minute.
2 in.	0¾ in.	6
2¼ "	0¾ "	9
2½ "	1 "	12
2¾ "	1¼ "	15
3 "	1½ "	22
3½ "	2 "	30

The efficiency of a pump without an air chamber will be somewhat less than this, as it might be found difficult under certain circumstances to work the pump to its capacity. The power necessary to obtain this efficiency depends, of course, upon the hight to which the water has to be forced, as well as the distance. When one of the larger sizes is employed for raising water to a great hight, one man would probably be unable to work the pump to its capacity. The force pumps of all leading manufacturers are able to do this amount of work. The amount of power required, of course, depends upon circumstances. When the pump is continually supplied with all the water it can take, the amount of power required will be at a minimum, and the pump will be able to work up to its full capacity. An air chamber on a small suction pipe is almost a necessity, because it frequently happens, in a city, that the small head of water in the street mains, and the small pipe used to bring water, prevent a sufficient supply from reaching the pump, and consequently the pump does not do half the work of which it is theoretically capable. The addition of an air chamber below the pump keeps a constant stream flowing to the pump, and at the same time acts as a reservoir from which the pump may draw a supply at each stroke. The ordinary water charger or primer used on common suction pumps answers this purpose and adds greatly both to the ease and the capacity of a force pump under the circumstances we have named. Their cost is small, but their utility is very great and will repay the expense and trouble of applying them.

In city houses the pump most used for raising water is a side pump mounted on a plank. These pumps are often sold unmounted. They are very convenient to fasten to the side of a building or partition, as they have side ears, while the suction pipe and lower connection can be got at without disturbing the pump. The brake is usually arranged so as to be right or left hand as may be desired. The parts are commonly all brass. In too many cases they are perhaps without an air chamber. Sizes vary from the small 2½ inch bore, with a capacity of 12 gallons per minute, up to 4½ inch bore, capable of delivering 50 gallons per minute. When a steady and constant stream of water is required to be forced up, and a rapid supply needed, a double acting suction and force pump is used. These pumps deliver water at both upward and downward strokes. A pump with 2¼ inch bore will deliver about 16 gallons per minute; with a 2½ inch bore 24 gallons; 3¼ inch bore 52 gallons; 4⅛ inch bore 100 gallons per minute. Such pumps when furnished with an air chamber and hose are very effective for throwing a stream of water either for fire purposes or for washing windows, carriages and sprinkling walks. The larger sizes are very heavy and require so much power that a power pump would in many cases be preferable. In putting up pumps of this class large pipes are absolutely necessary, since the waste of power in forcing the large quantity of water, which they deliver through small pipes, is enormous.

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One of the most common methods of raising water by power is by using the so-called hydraulic ram. The simplicity of operation of the hydraulic ram, its effectiveness and economy, together with the fact that it is applicable in thousands of situations now without water, render a better knowledge of its operation extremely desirable. The following facts in regard to this apparatus will be interesting to most of our readers. The hydraulic ram is decidedly the most important and valuable apparatus yet developed in hydraulics for forcing a portion of a running stream of water to any elevation, proportionate to the fall obtained. It is perfectly applicable where no more than 18 inches fall can be had; yet the greater the fall applied, the more powerful the operation of the machine, and the higher the water may be conveyed. The relative proportions between the water raised, and wasted, is dependent entirely upon the relative hight of the spring or source of supply above the ram, and the elevation to which it is required to be raised—the quantity raised varying in proportion to the hight to which it is conveyed, with a given fall; also, the distance which the water has to be conveyed, and consequent length of pipe has some bearing on the quantity of water raised and discharged by the ram, as the longer the pipe through which the water has to be forced by the machine, the greater the friction to be overcome, and the more the power consumed in the operation; yet it is common to apply the ram for conveying the water distances of one and two hundred rods, and up elevations of one and two hundred feet. Ten feet fall from the spring or brook to the ram is abundantly sufficient for forcing up the water to any elevation under, say, one hundred and fifty feet in hight above the level of the point where the ram is located; and the same ten feet fall will raise the water to a much higher point than above last named, although in a diminished quantity in proportion as the hight is increased. When a sufficient quantity of water is raised with a given fall, it is not advisable to increase said fall, as in so doing the force with which the ram works is increased, and the amount of labor which it has to perform greatly augmented, the wear and tear of the machine proportionably increased, and the durability of the same lessened; so that economy in the expense of keeping the ram in repair would dictate that no greater fall should be applied for propelling the ram than is sufficient to raise a requisite supply of water to the place of use.

To enable any person to make the calculation as to what fall would be sufficient to apply to the ram to raise a sufficient supply of water to his premises, we would say that in conveying it an ordinary distance, of say 50 or 60 rods, it may be safely calculated that about one-seventh part of the water can be raised and discharged at an elevation above the ram, five times as high as the fall which is applied to the ram, or one-fourteenth part can be raised and discharged, say ten times as high as the fall applied; and so in that proportion as the fall or rise is varied. Thus if the ram be placed under a head or fall of five feet, of every 7 gallons drawn from the spring one may be raised 25 feet, or half a gallon 50 feet. Or with ten feet fall applied to the machine, of every 14 gallons drawn from the spring one gallon may be raised to the hight of 100 feet above the machine, and so in like proportions, as the fall or rise is increased or diminished.

The following is an example of what a ram will do when properly set up and with supply, etc., properly proportioned to each other.

The fall from the surface of the water in the spring is 4 feet. The quantity of water delivered, per 10 minutes, at the house, is 3¼ gallons, and that discharged at the ram, 25 gallons. Thus nearly one-seventh part of the water is saved. The perpendicular hight of the place of delivery above the ram is 19 feet, say 15 feet above the surface of the spring. The length of the pipe leading from the ram to the house is 190 feet. The pipe leading from the ram to the house has three right angles, rounded by curves. The length of the drive or supply pipe is 60 feet. Its inner diameter one inch. The depth of water in the spring over the drive pipe is 6 inches. The inner diameter of the pipe conducting the water from the ram to the house is three-eighths of an inch.

It is very essential that the drive or supply pipe should be laid as straight as possible, as in the motion of the water in this pipe consists the power of the ram.

Care should be taken to set the ram in a pit deep enough to protect it from frost, or else by being boxed up the frost should be kept out.

The following table gives the capacity of rams of different sizes, together with the weights and diameters of pipes to be used in connection with them:

Size of Ram.	Quantity of water furnished per minute, by the spring or brook, to which the ram is adapted.	Length of Pipe. Drive.	Length of Pipe. Discharge.	Caliber of Pipes. Drive.	Caliber of Pipes. Discharge.	Weight of Pipe if of Lead, or if of Wrought Iron, then of ordinary weight.
No. 1	2 to 3 gals. per min.	25 to 50 feet, where desired.		¾ inch.	½ in.	6 lbs. per yard.
" 2	3 to 5 " "	" "		1 "	¾ "	8 " " "
" 3	5 to 7 " "	" "		1¼ "	1 "	10 " " "
" 4	7 to 10 " "	" "		1½ "	1¼ "	12 " " "
" 5	10 to 15 " "	" "		2 "	1½ "	16 lbs. per yard.
" 6	15 to 20 " "	25 to 50 feet.	Drive Pipe for any head or fall not exceeding 10 ft.	2½ "	2 "	40 to 45 " "
" 7	20 to 25 " "	" "		2¾ "	2¼ "	60 lbs. per ft. c. iron.
" 8	25 to 30 " "	" "	Discharge Pipe for any rise not over 50 feet.	3 "	2½ "	8 lbs. per rod.
" 9	30 to 35 " "	" "		3¼ "	2¾ "	11 " " "
" 10	35 to 40 " "	" "		3½ "	3 "	14 " " "
" 11	40 to 45 " "	" "		3¾ "	3¼ "	16 " " "
" 12	45 to 50 " "	" "		4 "	3½ "	18 " " "
" 13	50 to 60 " "	" "	Discharge Pipe for over 50 and not exceeding 100 feet in hight.	4¼ "	3¾ "	8 lbs. per yard.
" 14	60 to 70 " "	" "		4½ "	4 "	9 " " "
" 15	70 to 80 " "	" "		4¾ "	4¼ "	10 " " "
" 16	80 to 90 " "	" "		5 "	4½ "	11 " " "
" 17	90 to 100 " "	" "		5¼ "	4¾ "	12 " " "

If the ram is to be placed under a greater head or fall than named in the above table, it will, of course, be necessary to increase the weight and strength of the drive pipe; also, if the water is to be forced to any greater hight than above mentioned, the discharge pipe should be proportionately increased in weight and strength. Where the water is to be forced to any great distance (say more than 1200 feet), it is preferable to use a discharge pipe of larger caliber than named in the above table.

With a given supply of water under a great fall, the ram is not required to be of a larger size than for the same quantity of water under a less fall. That is, a No. 4 ram would be of sufficient capacity for taking the water from a spring or brook furnishing 7 gallons per minute, where the fall is 8 or 10 feet; if there is not over 3 or 4 feet fall to the same spring or brook, then a No. 5 ram would be better adapted to the place.

If the stream is a large one, and a greater supply of water be required than one of the above sized machines will supply, then increase the number of the machines in preference to having one machine of a larger capacity than above named. Several rams may be set so as to play into one discharge pipe, each ram having a separate drive pipe applied from spring to ram.

The durability of these rams under constant service is quite wonderful. We know of a ram put up in Durham, Conn., in 1847, which had been in constant use up to the time when we last heard of it, in 1873, and which had not cost $5 for repairs, and seemed good for many years more. The drive pipe was 1¼ bore, 40 feet long. The discharge pipe was half inch in diameter and 825 feet long. The water was discharged 85 feet above the ram in a perfectly steady, handsome stream.

Adams & Co., glass manufacturers, Pittsburgh, will before long have their new gas glass melting furnace in operation. This is a recent French invention, and it is claimed that it is much more economical than the coal furnace. The gas is generated from "slack" coal. Furnaces heated in the usual way require the bottom to be renewed every few months, but it is said the bottom of this style of furnace will last for an indefinite time. This will be the first furnace of the kind introduced into Pittsburgh.

USE THE BEST.

Pawtucket, R. I.

The American File Company have the exclusive right to use the Bernot process for cutting files By this method all the advantages of hand cutting are secured, together with an accuracy unattainable in hand work. They are the only manufacturers who employ machinery for testing files and steel.

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Price lists and information furnished on application.

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McCaffrey's Standard American Hand Cut Files and Rasps are warranted to do more work than any other files and rasps in the market.

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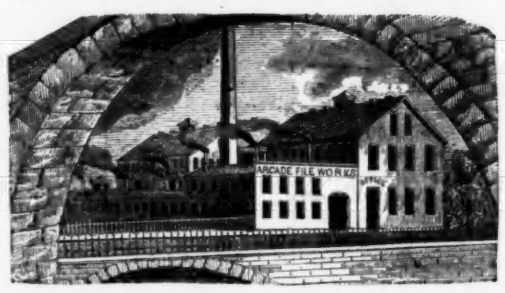

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Made of Best English Cast Steel.

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Manufacturer of HAND-CUT **FILES.** Warranted CAST STEEL.

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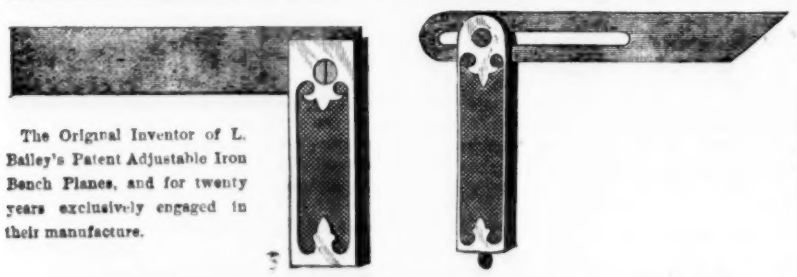
All descriptions of Files made to order. Price List mailed on application. **Established 1863**



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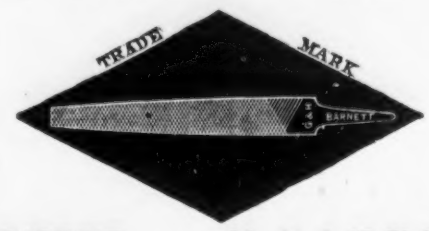

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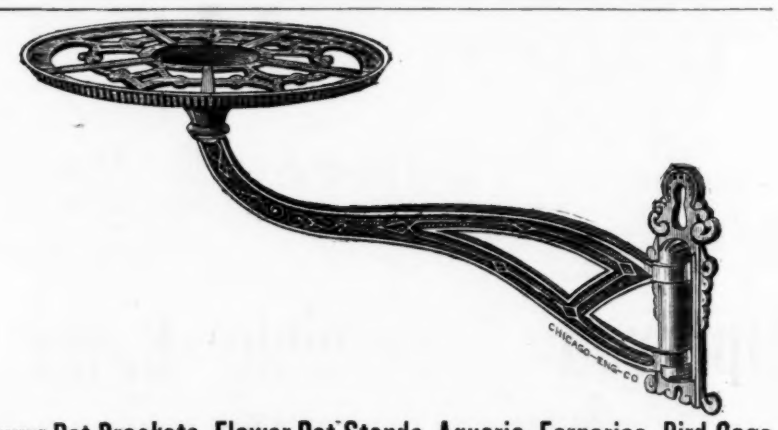

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Improvement in Scissors.

There seems to be no article of common use which needs improvement more than the scissors, and none which has received so little attention from inventors. For quick work, where both hands are needed at short intervals, the form is about as bad as it could well be and at the same time accomplish the object intended.

We illustrate on this page two improvements in scissors which tend to greatly increase their utility and the ease and rapidity with which they are handled. The first of these is intended particularly for the use of dry goods salesmen and machine operators, but will be found convenient by many others. This form is shown in Fig. 1. The peculiarity is in the form of the handles, which terminate in rings, allowing the tool to be used as an ordinary shears, by inserting the second and third fingers in the rings, thus giving additional power and efficiency. By placing the thumb and little finger in the rings, the scissors may be used as clippers, applying the thumb and forefinger of the hand to either side of the blades, to clip the selvage of cloth or the thread of the machine in sewing. The great advantage of the new scissors, when used in this manner, is that the hand is left free to handle or measure goods, tie bundles or use the pencil, or to guide the work of the sewing machine, retaining the scissors at the same time in such a position that they may be used at any moment for the different purposes desired. The round-pointed scissors are adapted for gentlemen's use, and are intended to be carried in the pocket. Fig. 2 represents a pair of scissors of this style for ladies' use. Messrs. Bruder & Wilks, 323 Broadway, are bringing out this improved form.

Fig. 1.

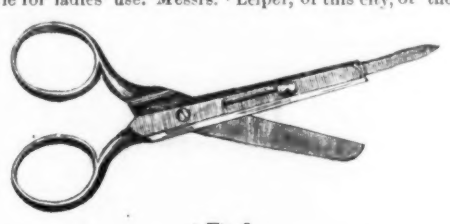

Fig. 2.

Fig. 3 illustrates another improvement, by which scissors and knife are combined in one. They can be used for either purpose without interference. The knife pushes by a spring back into the blade when not in use. The figure shows the improvement as applied to gentlemen's scissors, the blade extended; it is applied in the same manner to those with sharp points for ladies' use. These scissors can be used not only for cutting but for paring the nails, sharping lead pencils, erasing blots, opening letters, cutting button holes, or for any other purpose for which knife or scissors may be employed, and without imparing the convenience of either. The knife blade if broken can easily be replaced. This form is manufactured and for sale by the Johnson Knife and Scissors Company, of 90 Warren street, New York city.

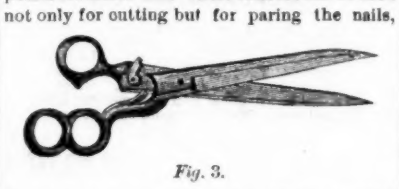

Fig. 3.

A Revolutionary Letter.

The Zanesville, Ohio, *Courier* prints a letter in possession of a gentleman of that city, written by a patriotic iron master of revolutionary times:

NEW YORK, HORNE HORKE AT HELL GATE, Sept. 8, 1776.

Ever loving wife, after remembering my love to you, I muft iuforme you that I arrived at this place laft Tuefday; we had a very long pafage, and the men of war was but a lital behind us; they arrived within four milds the nex day, where they now lay ancord—our army have had a long engagement and have cum off with considerable loss; it is said they have taken seven hundred of our men and killed seven or eight hundred more; it is reported that the enemy have lost more men than we have—among those of our men that are taken their is Lord Starling and Gen. Solovan, and they have let him go upon the prole of honor to our Continental Congress—Sum says that he is sent from Lord How to apploy for conditions of peace, but Gen. Putman told me that he was gon to exchang prisoners, and that was all his award. It appears to me that our people intend to deliver up New York soon, and fortify a littal further up; they have already delivered up all our forts upon Long Island and the Governor's Island, and the enemy are very thick upon Long Island, just opposite against us, whare we can fire across with small arms. There is a large incampment in sight of this place, and they are incamped four miles further east upon Long Island. But we are not discureged; yet this is no more than what might be expected, so long as more than half the inhabetence of Long Island are Tores. I have nothing more remarkebeel to rite; my compeney is generally well, and so most of the regiment. York Records, a negro fellow in compeny, died with the small pox sum time ago; their is none of it now. Jophna Towr, a young lad in my compeny, was exceeding sik with the camp fevour when I got hear and the next day died. I have non sik with it now. I should have sent Him sum money now, but we have not drawed aney as yet, by reson of theas difficalteys, but expect to draw soon. I want the gitting of iron ore to be forwarded as much as posabeel, and also laing in for cole as much as posabeel. J. Beaty, that is my brother, and Nathan, would exorte themselves. Let them leave no stone outturned in forwarding the furnace affairs. I shall be at hom in two months if nothing extrodner happens. Since I begun to rite this letter, our people have concluded to keep New Yoark if posabeel, and are fortifying with all speed. I have nothing more extrodner to write, but subscribe myself your loving husband,

JIM PERRY.

A Scrap of Early Railway History.

A recent number of the Philadelphia *Sunday Dispatch* says:

"Of similar interest was an experiment by Thomas Leiper, in order to show the uses and importance of railroads for the purposes of transportation. The experimental railroad—the first ever laid down in America—was set up in September, in the large yard attached to the Bull's Head Tavern, in Third street, above Callowhill, in the Northern Liberties. Professor Robert Patterson, of the University of Pennsylvania, Callender Irvine, Superintendent of the United States Mint, and John Glenn, agent for Thomas Leiper, certified that they were 'present at a satisfactory experiment by Thomas Leiper, of this city, of the great utility of railroads for the conveyance of heavy burdens—an improvement which, a few years ago, was introduced into England and some other parts of Europe—as in many cases a cheap and valuable substitute for canals. In the above experiment a railroad was laid of two parallel courses of oak scantling, about four feet apart, supported on blocks or sleepers about eight feet from each other. On this railroad, which had an ascent of one and a half inches in a yard, or two degrees and twenty-three minutes, a single horse, under the disadvantage of a path of loose earth to walk on, hauled up a four-wheeled carriage, loaded with the enormous weight of ninety-five and a half hundred, or ten thousand six hundred and ninety-six pounds.'

"Reading Howell certified that he had seen 'Thomas Leiper's newly-made truck wagon fixed on the railroad, about twenty-one yards long, for the purpose of making experiments in the Bull's Head Tavern yard, Northern Liberties, on the 31st of July."

In the notice of these experiments in the *United States Gazette*, of September 29th, 1800, it was said:

"Nor can we close this brief notice of an interesting work without paying a merited tribute of applause to the patriotic enterprise of the gentleman who has been the first in America to engage in it; and we hope he may derive as much advantage from it as such an example to the public fully entitles him to."

But Mr. Leiper was not content with the mere demonstration of a theory. He desired something practical. In the *Aurora*, of September 27th, Thomas Leiper and George G. Leiper invited proposals for contracts 'for digging part of a railroad from our quarries on Crum Creek to our landing in Ridley, Delaware county. The distance and level, ascertained by Reading Howell, is exactly three-quarters of a mile.' They also desired to contract for making and laying the rail part of the same, consisting of wood. Specifications were to be furnished by Large & Winpenny, at their manufactory, adjoining the Bull's Head tavern, Northern Liberties."

Accumulating Hydrostatic Pressure.—According to the invention of Mr. Louis Mesdach (of Messrs. Oescher, Mesdach, and Co.), of Paris an accumulator is constructed with the cylinder and plunger inverted, the plunger being fixed on a pedestal foundation, while the cylinder moves up and down over the upper end thereof. The loaded tank is formed with its bottom bulged up to a considerable extent, being thus in great part of annular form, and it is suspended from the lower end of the cylinder by the central part of the bulged up bottom, so that the center of gravity of the tank is always below its point of suspension, and the use of guides is thus dispensed with. Manholes are provided through the annular part of the tank to gain access to the packing of the cylinder.

The halcyon days of shipbuilding have not yet returned to the Pine Tree State, the number of vessels built in Maine this year being only 152, with an aggregate tonnage of 75,060·45, a decrease of 47,488·29 tons as compared with last year, and of 14,767·32 tons as compared with 1873.

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Wood Screws, Steel in Sheets.

BAND SAWS. TOOLS FOR BRAZING, &c.

Bed Screws, Pin Hinges, and Wire Nails a Specialty.

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Saws of all kinds.

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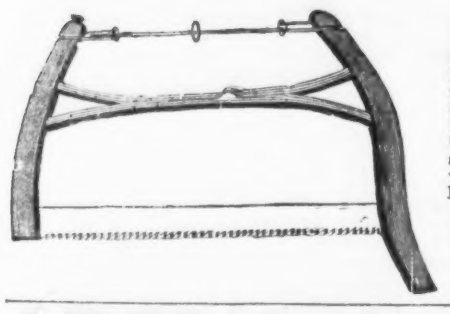

Elliptic Forked Saw Frame.

Patented June 28th, 1870.

The annexed engraving represents my ELLIPTIC FORKED SAW FRAME, which commends itself to the trade for its simplicity of construction. The Forked Brace being all in one piece, without any center bolt, secures for the Frame great strength and durability. These Frames are put up with my best Webs, marked "No. 40, Harvey W. Peace."

HARVEY W. PEACE,
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PERFORATED CROSS-CUT SAWS

And SOLID SAWS of all kinds. Trenton, N. J.

THE SILVER STEEL

DIAMOND CROSS-CUT SAW.

$1.50 Per Foot.

Patent Secured

PATENT HANDLES AND GAUGE INCLUDED.

THIS new Saw, which is destined to take the place of all Cross-cut Saws in point of **SPEED AND EASE**, is manufactured by **E. C. ATKINS & CO., Indianapolis, Ind.**, who are the

SOLE MANUFACTURERS FOR THE UNITED STATES.

So confident are we that this is the best Cross-cut Saw in the market that we CHALLENGE THE WORLD. Orders promptly filled.

E. C. ATKINS. H. KNIPPENBERG.

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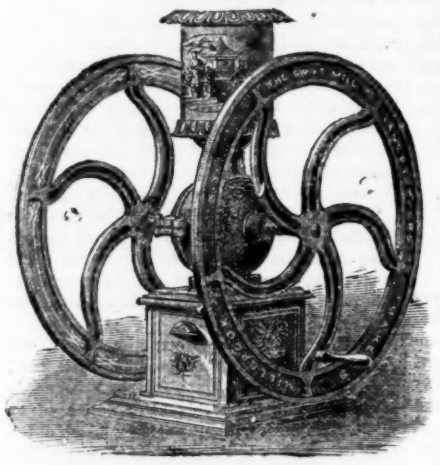
THE

SWIFT MILL.

ESTABLISHED 1845.



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The annexed cut shows one of the many styles of Coffee Mills of our manufacture, especially adapted to Grocers' use and all retailers of coffee. They are highly ornamental, and workmanship of the very best. Silver Medal awarded at the Great Fair of American Institute last autumn. We make more than 30 styles.

ALSO

Lane's Portable Coffee Roaster

Will roast 30 to 40 lbs. at once, and can be used as a stove at other times.
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Also sold by leading wholesale houses.

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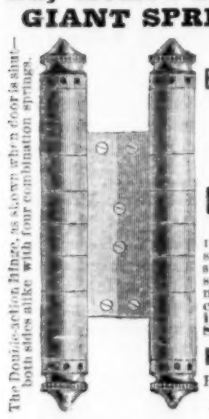
EXTRA PLATED TABLE CUTLERY. PATENT FORGED OX SHOES. The only Shoe made with concavity to fit hoof. BENCH AND MOULDING PLANES of every description, &c., &c. Drop Forgings to order. Address for Catalogue with stamp.

Buy House's Double Action GIANT SPRING HINGE



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Banks and Offices,
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And all
Public Buildings.

The Double-action Hinge, as shown when door is shut—both sides alike with four combination springs.

It has no equal. It swings the door both ways, forms a solid attachment on each side. Has four combination springs acting together, cannot settle nor sag. Will carry any weight, and is decidedly the Finest, Strongest, and Best made.

HOUSE BROS.,
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PUMP AUGERS and REAMERS

A SPECIALTY.

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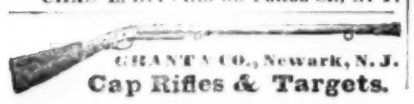

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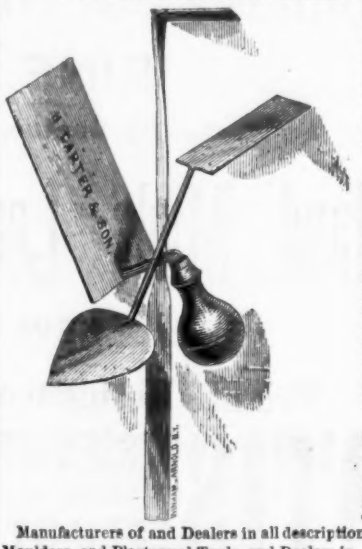

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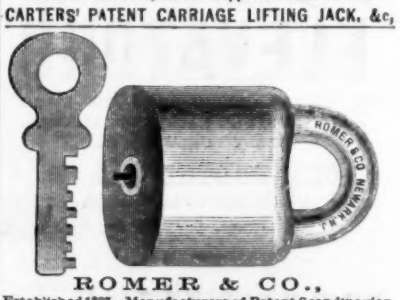

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PHILADELPHIA CORRESPONDENCE.

Office of *The Iron Age*, 220 South Fourth St., PHILADELPHIA, Jan. 11, 1876.

The warm spring-like weather of the past ten days has at last given way to something more like winter, and we are now having a slight intimation of what we may expect before the season is over. The mildness of the season so far has, however, been an inestimable blessing to the poor, of whom we have our full proportion.

The general tone of business is very sluggish; in fact, there is no great animation in any department, and in many branches there is complete stagnation. It is, perhaps, too early yet, to form any definite opinion of what the year will be; but in the meantime, the prevailing feeling is to curtail expenses, and to keep business within the smallest possible limits. This, undoubtedly, is a safe course, but it is more than probable that if a little less grumbling was done, and a little more spirit shown, it would have a good effect, and lead to an improvement sooner than otherwise will be the case.

The coal trade is in the same inactive condition which has been noted for the past two or three weeks. The product in the Schuylkill district, for the week ending 1st January, shows a reduction of seventy-five per cent. compared with the corresponding week last year, and the decrease for the whole year, as compared with the preceding one, is over thirty per cent. The outlook of the trade for the coming year is still clouded in uncertainty, though the operators, as well as the carrying companies, express quite a hopeful feeling. The present stock of coal, it is thought, will be pretty well worked off before the period usual for the opening of next year's traffic, and it is possible, the trade in all its branches, the current year, may considerably improve.

The following extract from the report of the Philadelphia and Reading Railroad Company is worthy of consideration, showing the folly of strikes and the immense loss attendant upon them:

"The principal feature in the business of the past season, and the cause of the largely decreased traffic, has been a prolonged strike in the Anthracite coal region, which for six months deprived the company of nearly its entire coal tonnage, and very materially reduced its receipts from other traffic which is always dependent upon the coal trade. The trades union of the operatives in the coal mines, known as the Miners and Laborers Benevolent Association, ordered a strike to take place on the 1st of January, against a reduction of wages to take place upon that day. Upon the 15th of June the strike was practically ended, and between the last date and the 1st of July work was generally resumed by the men at the reduced wages.

"The strike was one of the most determined that has yet taken place, and was attended by so many acts of violence as to involve the necessity of large expenditures for police, and require the most constant vigilance in order to protect the property of the company from incendiarism and other acts of agrarian outrage. Some idea of the cost of such a strike, and of relative difference between receipts and expenditures, during the respective periods of idleness and activity, may be gained by the following figures:

	Tons.
Coal tonnage of the company for 6 months during strike	1,033,241·14
Coal tonnage of the company for 6 months of business	4,472,213·02

"The difference in results, however, is still greater, the business of the six months of the strike showing a net profit of only $26,055·65, against a net profit of $4,504,712·54 for the remaining six months.

"Although the immediate results of the strike have been so disastrous to the business of the company during the past year, it is believed that the determined stand taken during the struggle by the company, and by the individual coal operators, has resulted in permanently rescuing their property from the arbitrary control of an irresponsible trades union, which, for so many years, has interfered in, and frequently dictated its management, while the workingmen themselves, being emancipated from the power of the political and professional agitators who have so long controlled them, will be equally benefited by the changed condition of affairs, and in many cases, by being absolved from obedience to rules which limited the amount of the daily product of their labor, have been able to earn more money than before the reduction in wages took place."

In the iron trade there appears to be no change whatever, and there are no special grounds upon which to base hopes of an improvement, unless it be in the fact that the Centennial Exposition will put a large amount of money in circulation, and that the railways will be benefited so largely as to enable them to make large expenditures, which will eventually be so far-reaching in its effects as to infuse new life into every department of trade.

There is one feature in the trade of our city which is very gratifying, viz., the continued growth of our export trade. The increase for the year just closed is about 10 per cent. greater than for the preceding year, and with increased facilities for transportation and handling freight and with the permanent establishment of an additional line to Liverpool, there is every reason to anticipate a larger increase the coming year than in any previous season. This expectation is based upon the fact that Philadelphia, by reason of the unrivalled facilities afforded by the Pennsylvania Railway Company, naturally controls the trade of a large extent of country, and its terminal facilities are vastly superior to that of any other American seaport. For instance, goods may be shipped from Chicago or any Western city, and be delivered by rail directly alongside the steamships without involving any expenditure of carting, warehousing or handling in any shape; or imports may be made in precisely the same manner. Those who have had experience of the unavoidable delays and expenses of handling goods in a city like New York will understand the significance of facts like these. Our total exports for the year amount to $32,000,000, of which Great Britain and her colonies took more than half, viz., $18,000,000. Our capitalists are beginning to appreciate the natural advantages possessed by Philadelphia, and while there is nothing spasmodic in her growth or business operations, she is steadily and surely pushing her trade in every direction, both by sea and land, and bids fair to exceed the most sanguine predictions that have been made in regard to her future.

The Elimination of Sulphur from Iron.

In a paper lately read at a meeting of the South Staffordshire Mill and Forge Managers' Association, Mr. W. W. Heele said, after all that had been said by chemists and theorists, the fact remained that sulphur could only be eliminated from iron by the two processes already known and practiced by the trade—"puddling" and "physicking." It was, nevertheless, an open question whether they practiced these two processes to the greatest advantage. Proceeding to show what had been done, and what results had followed, the author, after elaborately describing both iron and sulphur, said that in puddling sulphur was the last thing which was got rid of, and it was got rid of by burning, though, if they liked, they might term it "oxidizing." How was it, then, he asked, that with their certain knowledge that sulphur could be removed by the addition of "oxidizing fluxes," without at all increasing labor, and with very little, if any, increase of cost, they resorted so little to the use of these fluxes? The reply was that, when they were used, the puddler wanted extra pay, asserting that the iron was "physicked." Instead of asking for extra pay, the puddler ought to be very glad that physic was used, for its introduction reduced his labor at the same time that it produced a better class of iron. When, however, the men had fairly tried physicking, they would be glad of the change. To secure the necessary purification, intense heat was needed. In puddling by the old methods this was impossible; and so long as that method remained in vogue, physicking was a necessity, and should be resorted to. With new plants, such as the Danks or Siemens, this was unnecessary. Still, even with those systems, he thought that better results could be obtained if some ingredients should be introduced which would cause a chemical reaction, and displace the sulphur more quickly and more effectually. Mr. Heeley then gave interesting descriptions of the Siemens direct process, and of several other methods adopted by metallurgists on the Continent and in our own country, and dwelt upon the process patented by James Henderson, for "making the purest steel or wrought iron from the most inferior pig, and to thoroughly eliminate all sulphur, phosphorus and silicon." The materials which Henderson used were 100 parts Ringwood magnetic and titaniferous ores, and 40 parts of fluorspar. When the whole process had been sketched, Mr. Heeley said that it had been proved frequently that as the percentage of manganese increased in pig iron, so did the percentage of sulphur decrease. For example, if in blast furnace work the ore and coke which, in the ordinary way, would produce a pig containing from 2 to 3 per cent. of sulphur, manganiferous ore should be added so as to put 2 per cent of manganese into the pig, the sulphur would be reduced to ·05 or ·08 per cent.; but when 3 per cent. of manganese was found in pig iron, it never contained more than a slight trace of sulphur. As to the amount of phosphorus in iron, Mr. I. Lowthian Bell had stated that 30,000 tons of phosphorus were annually sent away in the iron of the Cleveland district alone. If this were converted into phosphoric acid, it would be worth £250,000 as manure. Remaining in the iron, it depreciated its value to the extent of £4,000,000, as compared with the same amount of hematite iron. This estimate, referring to one district alone, showed how vast would be the saving in respect of the aggregate product of the United Kingdom. There was, therefore, a wide field for chemical ingenuity in endeavoring to discover a method whereby the phosphorus could be successfully eliminated from the pig iron, and made into valuable manures. For the sake of discussion, he submitted the following propositions: (1) Sulphur could only be eliminated by the processes already known and practiced by the trade; (2) those processes were puddling and physicking; (3) mechanical puddling was the only puddling that could thoroughly effect the purpose; (4) if with their present plants, they could not effectually eliminate sulphur by puddling, ought they not to try to do so by physicking? (5) would it be desirable that their employers should pay a little more attention to the composition of the pig iron they were called upon to use, and let them have an analysis of the pigs so that they might have sure data to work upon? and, lastly, did they, as managers, pay sufficient attention to those matters, or were they quietly permitting their trade to drift into other channels, as some asserted, or was it that other places had greater natural facilities and advantages?

Messrs. Edwards, Rigby, Wright and the secretary took part in the discussion. Mr. Edwards thought that greater care should be exercised in the preliminary processes, so that the sulphur might be done away with before it got into the pig iron. The enemy should be detected by the pig makers and not allowed to escape from the blast furnaces; then there would not be the difficulty of getting rid of it when the pig iron reached the forge.

There was a general concurrence of view that the use of "oxidizing fluxes" was desirable; and experience, it was shown, was in their favor. Manganese, as a physic, was well spoken of.

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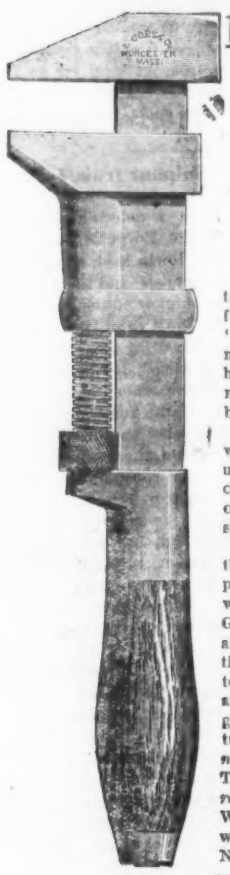

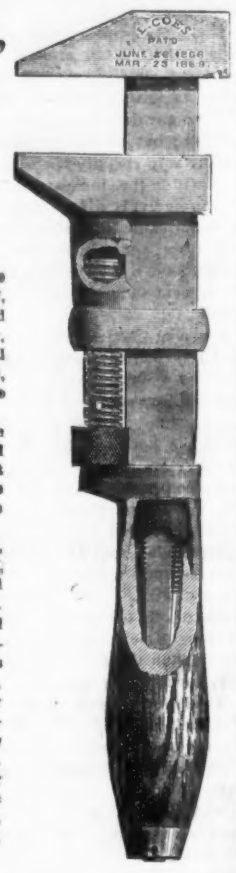

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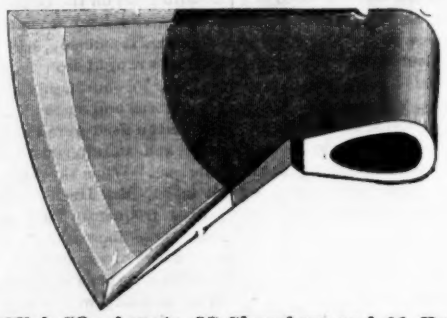

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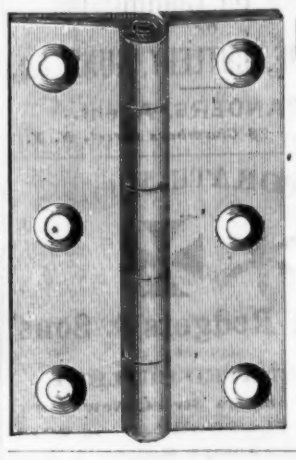

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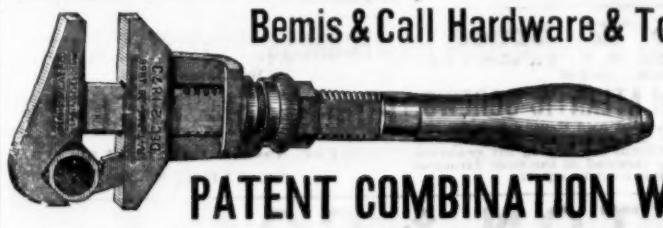

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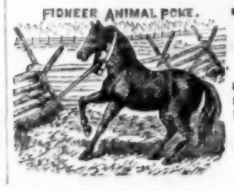

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The Iron Age.

New York, Thursday, January 13, 1876.

DAVID WILLIAMS - *Publisher and Proprietor.*
JAMES C. BAYLES - *Editor.*
JOHN S. KING - - *Business Manager.*

NEW YORK, January 2, 1875.

Until the 1st instant the postage on newspapers was paid by subscribers at the office where the paper was received, the yearly rates on the different editions of *The Iron Age* being as follows: Weekly, 40 cents; Semi-Monthly, 40 cents; Monthly, 24 cents.

Under the provisions of the new postal law, which went into effect on the 1st instant, prepayment at the office of mailing is required, at the rate of two cents per pound for the Weekly, and three cents per pound for the Semi-Monthly and Monthly, which will make the postage as follows on the different editions: Weekly, 50 cents; Semi-Monthly, 30 cents; Monthly, 15 cents.

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Government Aid for the Centennial.

In dallying with the proposition to appropriate a million and a half of dollars in aid of the Centennial exhibition, Congress is doing great injustice to an enterprise of national importance. Whatever may be its decision in the matter, it should be given without unnecessary delay. If it will give the money, the commissioners should know it now and be able to make use of the larger credit thus secured to the undertaking: if not, the delay caused by waiting for the decision of Congress may seriously embarrass the commission. The exhibition is to open in May next. A vast amount of work, involving large expenditures, must be done during the next four months, and the money which Congress is asked to appropriate is needed at once. If it is to be given at all, the commissioners should have the use of it now: if not, they should know it now, to the end that they may make their arrangements in accordance with the amount of money at their disposal.

We do not, however, consider that the question is one over which Congress need long hesitate. The circumstances of the case are peculiar. When the project was first taken in hand by its most active projectors, it was believed that the people of the country would subscribe the needed capital. No doubt they would have done so under ordinary conditions, but just at the time when the most vigorous efforts to secure subscriptions were making, the panic came, and all classes of the community have suffered so heavily from the shrinkage of values and the suspension of so many of our great productive industries, that but a small part of the money expected from other States have been received to supplement the liberal appropriations of Pennsylvania and Philadelphia and the disproportionately large sums which the people of that State and city have subscribed. In the mean time, Congress and the President have done all in their power to internationalize the exhibition. They have invited foreign governments to participate, and the invitation has been accepted in good faith by nearly all civilized countries. The whole world, and particularly the people of the United States, have looked forward to the Centennial as an event of international importance, and the attitude of the government toward it from the first has been such that it cannot now say, "We are in "no wise responsible for the success or "failure of the enterprise, and will do "nothing to help or hinder it." If the money which Congress is asked to appropriate is needed, as we are fully assured it is, and Congress is satisfied that it will be judiciously and honestly expended, it should be given promptly. Congress cannot do less than this. Should the Centennial fall short of complete and satisfactory success for want of such assistance, such failure would be a national mortification and disgrace. No explanations would excuse the fact that we had attempted a great undertaking and failed to carry it through to a successful completion. We should suffer deeply in our national pride, our claims to national greatness would be laughed at and ridiculed for years to come by foreign nations, and we should enter upon the second century of our national existence with a humiliating sense of the ridiculous figure we had made before the world after so loud a flourish of trumpets. We may call the exhibition local, if we will, but, should it fail, the West and South would feel the mortification and shame as deeply as Pennsylvania or New York. Congress cannot be indifferent to these considerations, and we have no doubt the desired appropriation will be made, but nothing will be gained by a further coquetting with this obvious duty. An appropriation in aid of the Centennial will establish no precedent which can be pleaded by those seeking aid from the national treasury in building railroads or carrying out private schemes of any kind. Let us have all the economy in public expenditures to which Congress is pledged—and the more the better—but only a blind and niggardly policy would now withhold from the Centennial an appropriation, when money was freely given to secure a favorable representation of American interests at Paris and Vienna.

"Hard Times" in England.

Whether times are "harder" here or in Great Britain, it would be difficult just now to say. Probably the iron masters of each nation think their neighbors across the Atlantic better off than themselves; but were they to change places, it may be doubted if they would be any better satisfied than they are at present. An article in *Ryland's Iron Trades Circular* of the 18th ult. presents us a graphic summary of the condition of affairs in the principal iron making districts of Great Britain, from which we quote as follows:

The process of cheapening the make of finished iron goes on very slowly. But on all sides it is admitted that no revival in demand can be expected until wages are materially reduced. In the great iron centers of the North we are informed, by the highest authority, "the distress caused by the stoppage of the rail mills and other finished iron works is increasing, as every week more workmen, having exhausted their means, are added to those seeking relief. The area of suffering is also increasing, for pitmen and other workmen in the county of Durham, especially within the Bishop Auckland district, have been thrown out of work through the entire or partial stoppage of collieries. At Middlesbrough, this week, relief has been afforded in the shape of soup and bread, provided by public subscriptions. One works was restarted on Monday at Middlesbrough, but the extent of the distress has not thereby been diminished, as others have been stopped. At Stockton and South Stockton large numbers of men have been out of employ for some time, for whom some provision has also been attempted. At Darlington about 300 men have this week been paid off at one of the works.

Many of the men in the district have gone on the union funds. Others endure great privation rather than accept parish relief. A circular has just been sent out, signed by the president and other officers of the Iron Workers' Union to the trades unions of the United Kingdom, making an urgent appeal for the "distressed who are without food or fire, or means of securing support of any kind; even assistance from the parish has been denied. We are, therefore, driven to seek assistance from our fellow workmen in different parts of the country.', It is added that some of the employers had offered the workmen employment at a reduction of 10/ per week, which would place the men in the North of England in a worse position than the men of Wales, the reduction being equal to a third of the total wages paid. It is further stated that the funds of the association are nearly exhausted, as some of the works have been standing for months, and there is no sign of any improvement in trade.

While there is more or less privation among the iron makers and miners in this country, we are happy to say that there is no district where a parallel could be found to the condition of affairs above described. Nor do the prospects of the English iron trade seem so good as ours. While we are looking for some improvement next year, the British iron authorities say that any renewal of prosperity is simply impossible in the present condition of the home and foreign markets. Beside the inevitable reduction in wages the prices of ores and coal must come down considerably before a revival of profitable production can be looked for. The journal before quoted says of the outlook for the trade: "Pigs "are acknowledged to be cheap and out "of all comparison with the price of the "finished product. It will be months be- "fore any material change will be made "in the prices of manufactured irons, but "we may say, without any attempt at "prophesy, that a lower range of prices is "looming in the distance." A more comprehensive picture of the condition of the pig iron trade is given by the London *Daily News* of December 17th, in an article from which we quote the following:

Roughly speaking, it may be said that a third of the blast furnaces in the Cleveland ironmasters' district are out of blast; that in West Cumberland a larger proportion is similarly idle, and that in the Barrow district a similar state of affairs prevails. In the first and most important of these districts, the highest authority in the iron trade has described the state of affairs as "calamitous," and every week fresh additions are made to the list of northern iron works laid idle, and every week the distress among iron workers seems increasing. At Glaisdale and West Hartlepool all the blast furnaces are off work; at Newport on the Tees the bulk are unemployed, and from Easton to Consett, every center of the iron trade sees many of these huge ore smelters laid idle.

This, then, is the result of the commercial policy which, we are told, has made England the world's great producer and exporter of iron! This is the prosperity we have been invited to share by those who have tried to create a public opinion in favor of the abolition of so much of the tariff as affords protection to home manufactures in the home markets. From our standpoint, it looks very much as if England were no better off, all things considered, than we are. Evidently, free trade is not a safeguard against commercial depression and industrial stagnation, and we doubt if it is altogether satisfactory in its workings to the English iron masters, who find themselves compelled to compete, even for tuppenny home orders, with agents of Belgian manufactures who claim to be making a profit out of prices which do not cover cost in England.

Aspect of the General Copper Market.

No other metal has fluctuated so little since the great London failures in March last year, as copper. This steadiness is due in a great measure to the check which speculation between Chili and London received by reason of these very failures. When cable communication was opened to Valparaiso, the London copper speculators were but too glad to avail themselves of the opportunity for converting Chili bars into a sort of shuttle-cock, and the usual machinery was set on foot for dealing in "futures" on paper, *i. e.* cargoes or parts of cargoes afloat or to be shipped by either sail or steam. But failures in South America in consequence of those in London, curbed these speculative tendencies, and the dealings were restricted to a more legitimate trade between consignees of the metal on the one hand, and actual consumers on the other. An occasional speculative purchase and sale had thenceforward to be backed by a solid margin, which discouraged the operators who had been in the habit of venturing upon extensive transactions without adequate means.

The copper market was thus left to the influence of the natural laws of trade from the beginning of the season, and there is no prospect that this stricter basis for a more solid trade will be abandoned in the dealings with the West Coast during the present year. The following table shows the price of Chili bars in London at the beginning of each month last year:

January 1	£83	July 1	£83
February 1	83	August 1	79
March 1	82	September 1	83
April 1	80	October 1	82
May 1	83	November 1	82
June 1	83	December 1	81

On the 1st instant they stood £81. 10/. While prices varied but little, the stock on hand in England and France, as well as the visible supply, kept almost as steady, notwithstanding the extraordinary excess of imports over exports in the former country. The following shows the statistical position of the metal during 1875:

STOCK ON HAND.	Tons.	VISIBLE SUPPLY.	Tons.
1875.		1875.	
Jan. 1	30,668	Jan. 1	29,722
Feb. 1	31,608	Feb. 1	30,105
March 1	30,990	March 1	32,242
April 1	23,365	April 1	32,758
May 1	25,514	May 1	30,551
June 1	23,530	June 1	29,608
July 1	23,784	July 1	30,084
August 1	22,828	August 1	29,704
Sept. 1	23,022	Sept. 1	32,342
Oct. 1	22,358	Oct. 1	30,456
Nov. 1	23,549	Nov. 1	32,535
Dec. 1	20,885	Dec. 1	29,222

The London failures had the effect of causing merchants and consumers in France to draw direct from Chili the bulk of copper which they stood in need of; hence the enormous difference in the amount exported from England compared with the quantity imported—France in normal times preferring to procure bars from England.

According to the Board of Trade returns, England imported in the shape of ore, regulus, pyrites and bars or ingots, during the first eleven months of 1875, the large quantity of 70,549 tons, and re-exported but 47,159 tons in the shape of copper and its manufactures. In 1874 the imports were 64,550 tons, and the exports 56,134; in 1873, 63,289 tons, against 51,445 tons. In spite of this excess of 23,390 tons imported, the stock at Liverpool and Swansea, on Dec. 15, 1875, was but 12,004 tons of fine, against 10,400 tons in 1874; 21,600 tons in 1873, and 23,400 tons in 1872. This shows that the surplus had been delivered to consumers, and this increase in the deliveries can only be satisfactorily explained in one of two ways: Either England consumes more copper than ever before, or manufacturers have accumulated a large stock of their goods. We are inclined to believe that the latter is the case, for making every allowance for the admitted increase of consumption of copper for phosphor bronze, and apportioning a goodly share of this extra use to England, it can hardly be supposed that this new alloy absorbed any considerable share of that which has disappeared in the English market. On the Continent this is different. We know to a certainty that in 1875 the consumption of copper was largely increased by new uses, and that any augmentation which there may have been in production anywhere outside of the United States, will just cover the difference and no more.

There are no indications that, outside of this country, production has increased materially. Chili, in 1874, exported 48,253 tons, against 42,177 in 1873. During the first nine months of 1875 the export from that country amounted to 35,384 tons, against 34,980, 31,000 and 35,057 the previous three years, showing no notable increase. The actual charters made during 11½ months of 1875 were 45,400 tons, against 47,800 during the corresponding period in 1874, showing a decrease. Production in England slowly decreases, having been 4981 tons fine in 1874, against 5240 and 5703 the previous two years.

The world's general consumption has thus far been on the increase, for it stood as follows:

	Tons.
1874	89,691
1873	78,079
1872	69,291
1871	83,781

When the statistics for 1875 shall be all at hand, it will probably be shown that the consumption of 1874 has been exceeded. As it cannot be denied, however, that the demand for the manufactures of copper has been far from brisk for anything but purposes of armament, we shall have to guard against the assumption that copper will continue to be absorbed readily till business, both in Europe and this country, resumes its normal activity. The extra war demand in Europe has been very beneficial in its way, and has prevented a heavy decline, but it cannot be relied upon as continuous. On the contrary, the main expenditure for the new artillery has, we believe, been made, and copper is thus handed back to the normal influences of actual consumption by the people at large on the one hand, and the fresh supply we may count upon on the other, and these influences will prevail in the end, the more so, since speculation in copper has, for the time being, been crippled, if not in our own midst, in Europe.

Should there be, as we suppose, a large accumulation of manufactures of copper in England, and the war demand on the Continent cease, or be at least greatly diminished, we may, in the absence of a speculative support, soon witness receding values in the London market, especially if charters on the West Coast are resumed on a liberal scale.

In the United States we are no better off. We are fully aware that the demand for the manufactures of copper has been comparatively light nearly throughout the past year, and that goods have accumulated, the deliveries of raw copper to consumers having been on a most liberal scale. If the signs do not mislead us, we need not, therefore, look forward to a high ruling of copper values during the present year, and producers will have reason to be satisfied if they can sustain present prices.

The Semi-Annual Convention of Stove Manufacturers.

The National Association of Stove Manufacturers will hold their annual winter meeting in this city. The place of meeting will be one of the parlors of Delmonico's, corner of Fourteenth street and Fifth avenue. The Association will be called to order at 11 a. m. on the 19th inst. Members are requested to notify the president, Mr. S. S. Jewett, of Buffalo, of their intention to be present. It is believed that the meeting will be a large and important one. New York is the most convenient of all places of meeting at this season of the year, as nearly all manufacturers have some business here to attend to, and can make it more convenient to come here than to go to any other city. During the past three years the Association has gained an important position of influence, as nationally representative in character and purpose. It has already been instrumental in conferring important benefits upon manufacturers in placing a wholesome restraint upon the unreasonable and disastrous competition which previously characterized the trade; and has done much to promote a mutuality of sympathy and interest among manufacturers who had previously known each other only as bitter and uncompromising competitors. The dangers which at one time menaced its usefulness, if not its life, have been safely tided over, and many of those who looked with most distrust upon the association when first organized, are now convinced of its stability and usefulness. We can promise our friends of the East, West and South a generous welcome, and a visit full of interest. The occasion will be a pleasant one to all who may attend the convention as members or guests of the association. We are not informed what questions of importance to the trade are to be discussed, but under the wise and prudent direction of Mr. Jewett, whose ripe good sense, clear intelligence and extensive experience so conspicuously qualify him for the position of presiding officer, we may expect a harmonious debate leading to conclusions favorable to the best interests of the whole trade.

Imports of Metals at New York.

During the year ended with December, the total imports of general merchandise entered at the port of New York showed a considerable falling off as compared with previous years. A comparison of some of the items will be of interest to our readers:

	1875.	1874.	1873.	1872.
Iron bars	$793,805	$838,888	$2,381,835	$3,135,034
Iron pig	621,492	936,561	2,247,848	2,940,510
Iron R. R	419,587	5,099,006	9,051,583	9,485,512
Iron sheet	340,116	518,811	527,028	396,518
Copper	68,334	143,461	1,364,886	1,485,287
Lead	575,216	1,339,318	1,770,756	2,187,201
Spelter	64,368	122,691	306,910	473,302
Zinc	309,590	272,258	307,089	546,332
Tin and tin plates	8,066,692	10,676,886	10,885,775	10,561,611
Steel	1,086,713	1,338,227	2,466,275	2,771,794

These comparisons are interesting as showing the annual ratio of decline in the demands of this market for foreign metals since the panic, as compared with the year in which the panic occurred. The only item among our imports of metals showing an increase in 1875 over the two years preceding is zinc. The quantity has materially declined, but, owing to the high price of the metal, the total value shows the increase noted.

Once more the mechanics engaged in the shipbuilding trades have adopted a policy calculated to drive business away from New York. This time the calkers have struck against a reduction from $4 to $3·50 per day. The consequences of this strike are that several thousand men are idle, and the work they should be doing is going elsewhere. The men who have adopted this suicidal course would do well to remember that, by similar follies years ago, they broke up the shipbuilding business in and about New York, and compelled the establishment of yards further south, where labor is cheaper and more tractable. As a consequence, Wilmington, Chester, Philadelphia, and points along the New Jersey shore, have built up an extensive business in the construction and repair of wooden and iron ships, largely upon business

driven away from New York. Calkers' wages have suffered no material reduction for several years, and few branches of labor requiring no more skill or intelligence are as well paid as would be that of calking at $3·50 per day. To refuse these wages at this time, and go out in strike in the midst of a winter like this, when those who have work on any terms are fortunate, is sheer madness. This is part of the curse of trade unionism, and until our workingmen can throw off the chains of servitude to a system which makes them voluntary slaves to an irresponsible and despotic power of their own creation, we shall continue to witness such anomalies as this latest and most unreasonable strike. For the sake of the individuals comprising this trade, as well as of the community, we certainly hope the calkers' union will suffer utter and unconditional defeat. They have no grievance to complain of, no wrongs to right; and they cannot justly claim public sympathy, nor are they in the least likely to receive it under the circumstances.

The good free traders of Canada do not like to see foreign manufactures brought into the country. The Halifax *Reporter*, speaking of the importation of stoves from Philadelphia for the Intercolonial Railway, says: "It appears, so far as the "secret policy of a government can be "made out from carefully managed and "closely manipulated proceedings, that "the government have determined upon "reducing the manufacturing element, of "the Dominion to the lowest possible de-"gree of weakness." We are sorry the manufacturers of Canada feel so badly about it. If, however, they cannot make railroad stoves in competition with Philadelphia founders, after stealing American patterns for a dozen years, we should think they had better give up the experiment and try some other line.

New Publications.

THE INVENTION OF PRINTING. Illustrated. By Theo. L. DeVinne. Part I. Francis Hart & Co., 12 and 14 College Place, New York.

This is a "collection of facts and opinions descriptive of early prints and playing cards, the block books of the 15th century, the legend of Lourens Janszoon Coster, of Haarlem, and the work of John Guttenburg and his associates." The part before us consists of 112 pages on cold pressed paper, wide margins, uncut leaves, with typography that leaves nothing to be desired. This part is profusely illustrated. The list of illustrations proposed is very large, and the illustrations themselves would form a valuable volume.

We note among the subjects illustrated the following: The different methods of printing; antique methods of impression; key to the invention—different articles used; image prints, being fac similes; printed playing cards of early dates; Chinese printing; early book making; block books without text; block books with text. Under each of these heads there are a number of illustrations, a large proportion of which, in this part, are reproductions of ancient prints. From the prospectus we gather that the author's object was to produce a work with reference to the needs of the general reader and the printer. The present number treats of the development of the mechanical features of early printing, and does it in a very interesting way, avoiding the absurd controversies in regard to various points, and giving those facts and data which are useful and interesting to the reader. It is intended that the work shall present, in a compact form, the substance of modern knowledge concerning the invention of printing. And certainly, if the first part is a fair index of the character of the remainder, it will be all, and much more, than what the modest prospectus claims for it. In style and material it is worthy of great praise. It will be issued at intervals of about 6 weeks, and will be complete in five parts.

HOW TO BUILD SHIPS: An essay upon the weakness of large iron steamships, with recommendations for making them strong. By S. P. Griffin. D. Van Nostrand, 23 Murray.

The author of this little book signs himself, upon the title page, "A Seaman," and his remarks in the body of the work show that he has a knowledge of the treatment which a vessel receives when outside in heavy weather. After discussing the weakness of some of our large ocean steamers, built in strict accordance with the rules laid down by Lloyds, and showing the great difference between the resisting power of a vessel on even keel and one thrown down upon her side in a heavy sea, the author takes up and illustrates some plans of his own for giving a ship strength at the points of weakness. From the manner in which the behavior of ships at sea, and of the repairs necessary on reaching a port are treated, one is led to give weight to the opinions of the author, who seems to be a practical man. The number of instances in which large first-class steamers have returned from voyages, and have been found seriously damaged, is becoming much too large, while the number of ships lost at sea, of which no tidings have ever been received, gives uneasiness to all who have given the subject much attention. For these reasons the little work is worth careful perusal and serious attention. It is evident that a reform in the matter of ship building is needed, and every indication of careful consideration on the subject is a cause for congratulation. The following are some of the topics touched upon: ship's girders; the change from wood to iron; durability; framing; first iron vessels; magnitude of waves and nature of sea strains; danger line; deficient tieing; danger from rolling; line of greatest weakness; the cylindrical form; half distance frame; bilge keels; decks; cause of hogged steamships; repairs; and lastly, strong steamships a special Providence.

MARTINDALE'S UNITED STATES LAW DIRECTORY FOR 1875-6. By James B. Martindale, 293 and 295 Broadway.

This work contains "The names of one or more of the most reliable law firms and real estate agents in each of the principal cities and towns of the United States and Canada," and an extensive digest of the commercial law of each of the States and Territories. It also has the bankrupt law in full, with forms and rules of court. The work contains 813 pages, usual law library style, and appears to be a work of great value for the business man whose dealings extend outside of his own immediate neighborhood.

SAFETY VALVES. By Richard N. Buell, C. E. Science Series. D. Van Nostrand, 23 Murray street, New York.

This little work, reprinted from the *Railroad Gazette*, was undertaken for the purpose of bringing into form available for every one all the necessary information in regard to safety valves. The writer did not aim to produce much that was original, but has gathered from all possible sources a great deal of useful and valuable information not commonly accessible. The problems arising in relation to the proportioning safety valves have been systematized in such a way that they may be solved by those who have but an elementary education. In fact, any engineer who has any knowledge of arithmetic can by the aid of this little work solve any of the problems he is likely to encounter connected with a safety valve. At the same time the methods requiring a much higher knowledge are also presented, so that the methods are suited for all. The author well says, in the preface, that the importance of having the general principles of safety valves understood by those who are charged with the care of steam machinery, cannot well be overestimated. Yet, by far too large a proportion of our engineers are careless or ignorant in regard to this matter. "With a safety valve that is in reality all which its name implies, a large proportion of the risks incident to the use of boilers will be avoided; while, on the other hand, a safety valve, which is only such in name, is one of the readiest assistants to a disastrous explosion. In the body of the work we have: 1st. The requisite qualifications of a safety valve. 2d. Proportioning the parts for given pressures, under which we have the experimental method, graphical method, and the analytical method. 3d. Proper diameter for safety valve. 4th. Proper form for given lift. 5th. Merits of valves loaded with weights and springs. Under each of these heads we have examples, tables and cuts when necessary, and a variety of information. An appendix is added. We should be glad to know that this little volume was in the hands of every engineer in the country. Certainly we should have fewer inoperative safety valves and much less danger if some of the simple directions here given were followed.

New Dangers at Sea.

The London *Times*, in an article commenting on the Bremerhaven explosion, says:

The recent deplorable catastrophe at Bremerhaven has once more drawn attention to the fact that time and money still continue to be expended and talent wasted and misapplied in devising the most refined methods of executing the most dastardly and diabolical designs. Mechanical skill appears to be laid under special contributions in these matters, although it can scarcely be doubted that those whose skillful hands contrive these cunning devices are perfectly innocent of the intended application of their handiwork. As far as we at present know, he whose wasted life has just been closed by a pistol bullet at Bremerhaven employed an apparatus, consisting of a hammer, which was to strike a blow on some explosive substance at the end of a predetermined time, and which hammer was actuated by clock work. No precise description of the machine has as yet been given, although the exact particulars will doubtless transpire during the judicial inquiry. It is, however, by no means improbable that the mechanical arrangement will prove to be very much like one which was designed for a similar dastardly purpose nearly three years since. As stated in the letter of a correspondent, writing over the signature of "Warhawk," and which appeared in the *Times* of the 22d inst., there was at that time a conspiracy to ship a quantity of highly insured but worthless goods on board one of the Messageries Maritimes Company's vessels either at Bordeaux or Marseilles. With the goods was to be shipped an infernal machine, which at a given time was to explode, cause the destruction of the ship, and bring the conspirators their miserable reward. This machine consisted of a chest, containing a powerful explosive compound and an exploding apparatus. The principle of the exploder was that of the needle gun, a needle being driven into a primed cartridge and causing the explosion of the whole mass of the compound.

The mechanism consisted of a needle or striker, set in a bolt, at the other end of which was a spiral spring held in a tube. When the bolt was forced back into the tube there was, of course, a powerful pressure behind it tending to push it outward and to drive the needle into the cartridge. In order to hold the bolt back until the proper moment for the discharge had arrived, a catch or stud was formed on it, which was made to engage with a horizontal lever, having a hammer shaped head. The lever was connected with springs so arranged as to have a constant tendency to release its head from the catch. This tendency, however, was counteracted by a broad disc of metal which, being placed close against the lower part of the lever head, held it in its place in front of the catch on the needle bolt. In the disc was cut a notch sufficiently deep to allow the lever head to drop into it when that part of the disc was presented to it, and so to release the needle bolt. The disc was revolved by a train of clock work so speeded as that the disc should travel a given distance in a definite time. The edge of the disc was marked with a number of spaces, one space representing a day and the edge would travel through that space in one day. Assuming the disc to be marked into ten portions, and the machine to be required to explode in eight days, the lever would be set at the eighth mark from the notch. The clockwork would then be started, and the disc would revolve until, at the end of the eighth day, the notch would arrive at the lever head, which would be forced into the notch by its springs. The needle bolt would thus be released, and being impelled sharply forward by the powerful spiral spring at its rear would cause the explosion of the cartridge, and so of the whole mass of the explosive compound. Thus would be consummated a catastrophe from which it is probable no living soul would escape to record it. It is by no means certain that the miscreant Thomas was connected with the conspiracy in which this infernal machine was to have been used, although circumstances favored the supposition that he was. If he was, the publicity given to the matter at the time and the fact of the mechanism of the machine having become known would probably cause him to substitute a hammer falling on an explosive substance, for a needle penetrating a cartridge. And the matter would be by no means difficult; for, after all what we have, described is little more than a needle gun lock released by clockwork instead of by hand, and Thomas would only have to apply the principle of the percussion lock to his apparatus. This is what he probably did, as accounts tell us of the table broken by the force of the blow of the hammer when the machine was tried. How the fatal explosion came about is not quite clear, and possibly it never will be made any clearer than it is at the present time. It is to be accounted for on either one of two hypothesis—it may have arisen from the premature release of the hammer, or striker, by reason of a derangement of the machinery, caused by a violent concussion such as a fall would produce; or it may have been due to the explosion of the destructive agent itself from the same cause. The latter hypothesis, however, opens up the question of the nature of the explosive—whether it was pure nitro-glycerine or one of its compounds, lithofracteur or dynamite. If it was nitro-glycerine and it had become crystallized, which will happen at a temperature of about 43° Fahrenheit, a very moderate concussion would be sufficient to explode it; if it was lithofracteur or dynamite, the same temperature would only harden it and render it more inert than when in its plastic condition. This point was exemplified during some experiments carried out with lithofracteur in Wales, before the War Office Committee on Explosives, in February, 1872, and which were reported in the *Times* of the 22d of that month. There, upon igniting a sausage of lithofracteur with a capped fuse, the sausage being placed against a military stockade, only a portion of it exploded. A second attempt met with a similar result, while a third only caused the lithofracteur to take fire and burn. The cause of the inertness of the compound was the cold to which it had been exposed for some hours on a bleak hill top. This points to the conclusion that nitro-glycerine was the agent used, for it can hardly be supposed that proper care had not been taken to make the mechanism of the apparatus strong enough to resist the shocks to which transport would expose it. Moreover, the enormous and widespread mischief done appears to be greater than would have been effected by the quantity of dynamite which the box, if the size be rightly stated, could contain, but not more than would be produced by that bulk of pure nitro-glycerine. Beside, either lithofracteur or dynamite could have been procured on the Continent without exciting suspicion, whereas nitro-glycerine could not. The latter article, however, is freely used in some parts of the United States, and can be readily procured. Circumstances seem to point to nitro-glycerine as the agent which caused such widespread desolation at Bremerhaven. Other forms of infernal machines have been imported into the discussions which have arisen upon the Mosel catastrophe. Among these is the coal shell and the rat, of the latter of which there are two species. By the courtesy of the editor of *Iron*, we have recently had the opportunity of examining one of these coal shells, which came into his possession some two years and a half since. We are informed by him that, at the same time, two were sent as samples to a large colliery proprietor and coal shipper at Cardiff, who was offered any number. It is to be borne in mind, however, that the Plimsoll question was being warmly agitated at that time, and it is assumed by some that these coal shells emanated from some unscrupulous upholder of the good cause Mr. Plimsoll has in hand, with a view of strengthening his case. The coal shell is a hollow brass casting, representing a small lump of coal, about five inches long by three inches wide and two and one half inches deep. At each end is a hole for clearing out the core of the casting and afterward for filling it with the explosive compound. The object of these shells would appear to be not so much the destruction of the ship by their direct as by their indirect use. They were probably intended to be thrown among the coal in the bunkers, and with it shovelled into the furnace of a steam vessel. There they would explode under the boiler, and would probably by such means cause the loss of the vessel. It is possible that the intention might have been to fill them with some material which would explode, either after a certain time or at the high temperature sometimes present in coal cargoes. But the somewhat open offer of them to a coal shipper, in the circumstances, would appear to point to so very vague and aimless an end that the opinion that they were intended to promote the Plimsoll movement appears by no means unreasonable. The coal shells were evidently carefully moulded from a lump of coal, and when blacked readily deceive the eye. The "rats," of which there are two species, are of a more vicious nature. One species is intended to operate upon iron ships; the other upon wooden ones. The "iron ship rat" consists of a block of iron known as "Kentledge," which has a hole bored into it, in which is placed a tubular boring tool containing an acid. On the top of the boring tool is a lever, with a weight at its outer end, and this lever can work to and fro horizontally in a space cut out of the top of the Kentledge. The lever is, of course, carefully boxed in, and the surface of the iron restored. A confederate is required, who will place the machine in the right position—that is, with the bottom of the boring tool downward and on the iron skin of the vessel. Being so placed, the rolling of the ship causes the lever to move backward and forward, and the end of the tool to cut into the ship's plates, the action being promoted by the acid and by a slight pressure given to the boring tool by a spring. The terrible process may be somewhat slow, but is very sure. The wooden ship rat is a more complex machine, and possibly more ingenious. It consists of a box, in which are placed a pair of vertical cylinders, one at each end of the box, and spaced about five feet apart. In the center, between the two, is a horizontal cylinder, having a piston working in it, the rod passing through a stuffing box. The outer end of the piston rod works a ratchet drill, or auger, the auger being weighted. The two vertical cylinders are each half filled with water, and communicate with the horizontal cylinder by pipes, each having its own pipe leading to the end of the horizontal cylinder nearest to it. The consequence is that as the ship rolls the water alternately quits and returns to the vertical cylinders, and, acting first on one side of the piston and then on the other, communicates a reciprocating motion to the piston rod. This motion is converted into a rotary motion at the weighted auger, and in time a hole is bored through the planking of the ship, which gradually fills and may be lost before the seat of the leak is discovered. Provision is made for the release of the auger directly the hole has been bored and the resistance to it removed, when it silently drops through into the sea. Thus the hole is not plugged by the auger and the ends of villainy defeated. Should the hole be discovered and the box be examined, there is nothing in it, except to a professional eye, to show how the hole was produced. Like the iron rat, the wooden rat requires a confederate to place it well for its deadly work. Such are some of the devices for giving effect to one of the foulest offences against society.

The Danks Furnace in England.

In the course of an address before the Institute of Engineers and Shipbuilders, in Scotland, Mr. H. R. Robson, president, said:

To all shipbuilders, mechanical engineers, and others who use wrought iron upon a large scale, the production of that material at a cheap rate has become a matter of the utmost importance. On this account much inventive talent has been spent in recent years with a view of devising some thoroughly effective means for converting pig iron into wrought iron without depending so much upon manual labor. Several mechanical puddling furnaces have been brought under notice from time to time, but the general opinion now is, that to be really serviceable and economical, the puddling furnace of the future must itself rotate, so that while the iron of the charge is in the liquid state, and "coming to nature," it may be as completely and intimately exposed to the chemical influence of the oxygen of the air as is possible in the most perfect hand puddling. Chiefly through the exertions of the Iron and Steel Institute, and by the efforts and commercial enterprise of several English iron masters, there seems now to be good reason for believing that mechanical puddling has become a commercial success, or is upon the eve of entering the successful stage. The history of the subject during the last three or four years is invested with a great amount of interest alike to iron masters and engineers.

At the Dudley meeting of the Iron and Steel Institute, in 1871, a paper was read by Mr. Samuel Danks, of Cincinnati, on the revolving puddling furnace which he had invented and brought into successful use in America. Himself a South Staffordshire man originally, there was a peculiar fitness in his describing the invention in a district that has a world wide fame for its finished iron industry. Some of the best practical iron masters in the kingdom took part in the discussion which followed the reading of the paper, and such a high opinion was formed of the merits of the invention that the institute sent out a Commission of Inquiry, consisting of two practical iron manufacturers, one from Middlesborough and the other from South Staffordshire, and a highly skilled metallurgical chemist from Dowlais, in South Wales, for the purpose of making most rigid experimental investigations at the American ironworks where the Danks furnace was in operation. The commissioners reported most favorably regarding what they had seen, and the result was that several Danks puddling furnaces were forthwith erected and set to work in the Middlesborough district. After a time, however, they seem to have failed, chiefly from defects in mechanical construction. The difficulties that were met with naturally caused some disappointment. Messrs. Hopkins, Gilkes & Co., who were the first to commence the use of the Danks furnace, gave it up; but the Erimus Iron Works Company, whose managing director is Mr. J. A. Jones, one of the commissioners sent out to America, although they were not by any means satisfied with the results which they had obtained with the new furnace, resolved to continue, but to devote their attention in the first instance to the removal of the obstacles which they considered to be the chief drawbacks to the success of rotatory puddling. Amongst those drawbacks, were the educating of the workmen, and the removal of prejudice from amongst them, the difficulty with the "fettling" of the furnace, and the mechanical weakness of the Danks machine. In a letter addressed to the president of the Iron and Steel Institute, about six months ago, Mr. Jones stated that the difficulties with the workmen and in respect of the fettling of the furnace had disappeared; and in speaking of the improvements which had been made on the mechanical details of the rotary puddling furnace, he said that the directors were so satisfied with the work done by the modified machine that they had ordered five more, and the necessary engines to drive them. That, certainly, may be regarded as a hopeful sign of progress. Mr. Jones has recently been good enough to give me some still fresher information on the subject, in reply to a letter which I had addressed to him, asking how the question then stood. He says that the changes indicated in his letter to the president of the Iron and Steel Institute are being made, and that up to the date of his letter to me the company were quite satisfied with the results. Within the next week or two the whole of the contemplated changes will have been made, I believe, throughout the rotary puddling department at the Erimus Works, when, doubtless, the iron trade in all parts of the country will look anxiously for information on the subject in question.

Mr. Robert Heath, of the Ravensdale Iron Works, North Staffordshire, very early resolved on giving the Danks system of mechanical puddling a full and fair trial. His remarkable earnestness and enterprise seem to bid fair to receive their due reward. He started with six furnaces, and a few months ago he erected other four, making ten in all. Mr. Heath's efforts to make the Danks system a manufacturing and commercial success had excited such an amount of interest among practical iron masters that the members of the Iron and Steel Institute most gladly availed themselves of an invitation to visit the Ravensdale Iron Works on the occasion of the meeting of that body in Manchester a few weeks ago. Unfortunately, I have not been able to accept of the kind invitation lately made to me by Mr. Heath to visit his works, but I am happy to say that a gentleman who made a very careful personal inspection of the Danks furnaces and the mode of working, on the occasion referred to, has favored me with the impressions of what he saw. Though not actually engaged in the iron manufacture, my informant has made himself familiar with iron works generally. He says: "I can assure you that I looked forward with great pleasure to our visit to Ravensdale, and my anticipations were fully realized. Mr. Heath has embarked in this new phase of the iron manufacture quite enthusiastically. He had faith in the Danks system, and he seems to have determined to make it succeed. We found ten furnaces in full operation in two parallel rows under one roof; and no sooner had we entered the works than the members of our very large party distributed themselves around the various furnaces, into which they peered most anxiously, at the same time minutely questioning Mr. Heath, his managers, and the workmen, regarding the working of the furnaces, the weight of the charges, the quality of the pig iron used, the nature of the fettling, the durability of the internal lining, and the external casing, the number of heats per day, the yield per furnace, &c. Presently one of the furnaces was opened by drawing aside the movable mouthpiece, and in a few seconds there was drawn forth a puddled ball of some 8 or 9 cwt. upon a gigantic prong or fork, worked by gearing overhead; and by means of it the plastic mass of iron was carried into a Danks squeezer, in which it was subjected alternately to powerful blows from a horizontal hammer, and to the squeezing operation of a pair of curiously formed rolls. It was then passed to a 10 ton steam hammer under which it was worked into a bloom or slab, and afterward passed through the roughing rolls, and subsequently drawn out to a length of 16 or 18 feet, fully 12 inches broad and nearly 2 inches thick. All this was the work of a very few minutes; but it was most interesting, if not exciting, to the onlookers. Other charges were drawn and operated on during our stay in the works in the same way. We learned that Mr. Heath had made very important modifications and improvements upon the mechanism of the Danks furnace, which he had got to work in a surprisingly effective manner, and that in his hands the Danks system had become a decided success. Even six months ago he was rolling Danks blooms, in the ordinary forge rolls, 16 inch bars 24 feet long, more cheaply than by the old puddling process, to say nothing of the saving in waste in cutting up long bars as compared with bars one-fourth the length. We also learned that arrangements were in progress for turning out puddled balls weighing at least 13 cwts. Mr. Heath has not contented himself with rolling heavy plates from the Danks furnace, but has now begun to roll a great variety of the smaller sizes of merchantable iron; and, judging from what we saw at Ravensdale, I feel satisfied that very marked success is the result."

I am glad to say, gentlemen, that I have been in communication with Mr. Heath on the subject of the Danks system, and that gentleman informs me that he is satisfied with the results, so far as the quality of the iron is concerned. Commercially, he has not tested its merits, but he is satisfied that the iron is made considerably cheaper by the Danks system. He believes the great drawback to its introduction is that it cannot be applied to old works, as so few firms have the necessary plant to deal with the process on a large scale. But, in the true spirit of the man of progress, he goes on to say "that all this will be ultimately overcome."

Through the very great kindness and courtesy of Mr. Heath, which I cannot too highly appreciate, I am enabled to lay before you a most interesting collection of specimens, which are equal in quality to the finest iron that I have ever seen. By the examination of the sections where they have been broken, and also by the severe bending, twisting, closing and other tests that have been applied to them, you will be able to judge for yourselves of the quality of the iron produced by the Danks system at the Ravensdale Iron Works.

Two Direct Cutting Edges instead of One Scraping Point.

$1000 Challenge that the Lightning Saw is the Fastest Cutting Saw in the World. It will do more work, day in and day out, and I will back it against any responsible manufacturer.

E. M. BOYNTON,

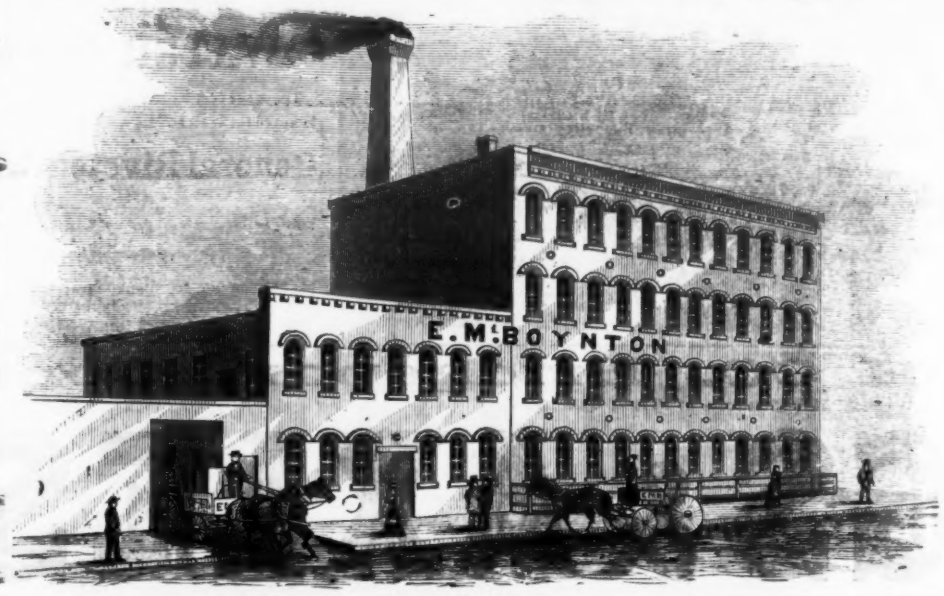
80 Beekman Street, New York.

Manufacturer of all Kinds of

First-Class SAWS.

Also, SAW FRAMES, PATENT CROSS-CUT HANDLES, SAW SETS, FILES, and Sole Proprietor

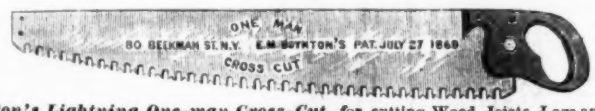
Of the PATENT LIGHTNING SAW.



Exact size and shape of Lightning Teeth for the Centennial year, to be illustrated at Philadelphia, Pa., by E. M. Boynton.

The attention of the trade is especially invited to the vindication of my Patent Saws as shown by the published Decree, Injunction and Costs of U. S. Court, of September 2d, 1875. In the mean time the other varieties of Clearing Teeth Saws have been overthrown and pronounced invalid. My Patent M Teeth alone stand as the only vindicated and protected Patent for Cross Cut and Buck Saw Teeth. I shall proceed at my leisure to make it interesting to infringers, having retained Gen'l Butler and other excellent counsel. ☞ My advice to the trade is to cease selling counterfeits of my goods. I will make any of these imitation goods at prices as low as they can be made, of good material and workmanship, while I will furnish the genuine Patent Lightning Saw at 50c. per foot by the dozen Special terms made with the jobbers and agents for quantity.

Boynton's Patent Lightning Cross-Cut Saw. Price 50c. per foot, Set and Sharpened.



E. M. Boynton's Lightning One-man Cross-Cut, for cutting Wood, Joists, Logs and Timber, and sawing down trees, to which can be attached one of my Patent Adjustable Handles, removable at pleasure. Complete, ready for use. ***Price, 60c. per foot.*** Sizes, 3, 3½, 4, 4½, 5, 5½ and 6 feet. Millions of Axes are in use, where, by using this Saw, half the time would be saved, and no waste of fuel occur.

Frame made of best seasoned stock, and warranted the stiffest adjustable braced frame in the market. Gives universal satisfaction. (30 inch) complete, with Lightning Blades, $8·50 per doz. 100,000 sold and cannot get enough of them made *perfectly* at my own manufactory.

This cut represents the use of my special files, made to fit the angle of the teeth, dressing both points at a single blow, making the saw the simplest and cheapest to file in the world. The shortening of the tooth the thickness of a sheet of paper (which is all any single tooth penetrates) leaves but little dressing necessary. For the undulled edges of the outside of M, the third surface of the file is all that will be needed. They are made 3d cut of highest quality. By the use of this file all difficulty is removed, and the cost of filing Lightning Cross-cut Saws at the factory is two cents per foot; buck saws four cents each. The cost of the 10 inch for cross-cuts is $4·20, net, per dozen; 5 inch, for buck saws, half price. A large stock kept constantly at my store in Beekman street.

10 INCHES LONG.

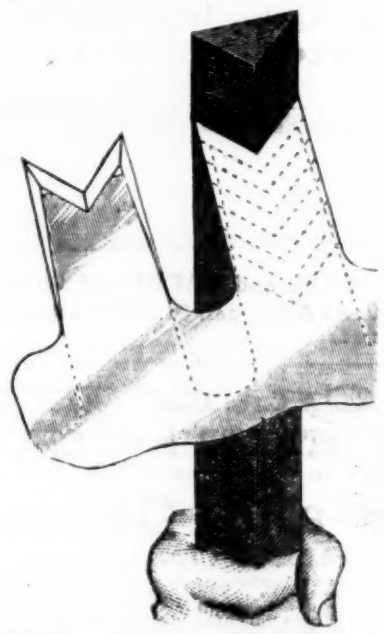
BOYNTON'S PATENT SAW-SET.

PATENTED NOVEMBER 25, 1873.

Best cross-cut saw-set in the market. A blind man can use it. Sets any kind of a cross-cut saw. Always ready for use; adjusted by a single thumb screw. Can set a saw in field or forest, without any other tools, as well as in a saw shop. No prying, wrenching or hammering in setting, like most other saw-sets.

DIRECTIONS FOR USING.—Simply hold saw in left hand, and then place set on saw tooth, as represented in cut, on the gauge, then with right hand bring handles of set together, and the tooth is set. If more set is wanted, gauge back so set can take a deeper hold of tooth. It will also set my Lightning Buck Saw Blades, 4 teeth at once. It has only to be used to be appreciated.

dozen, $8·40 net; sample sent by mail to dealers on receipt of $1·00.

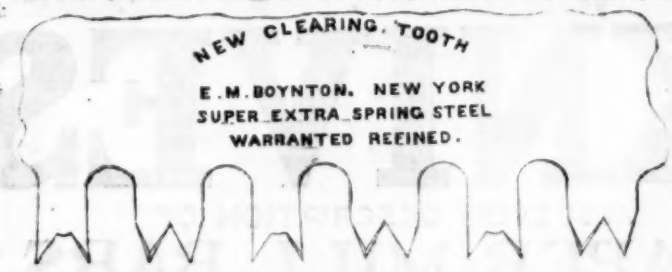


The New Centennial Handle.

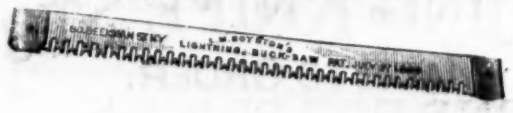
$15 per Hundred.

This Handle, made with Heavy Malleable Castings, will be ready Jan. 15, 1876.

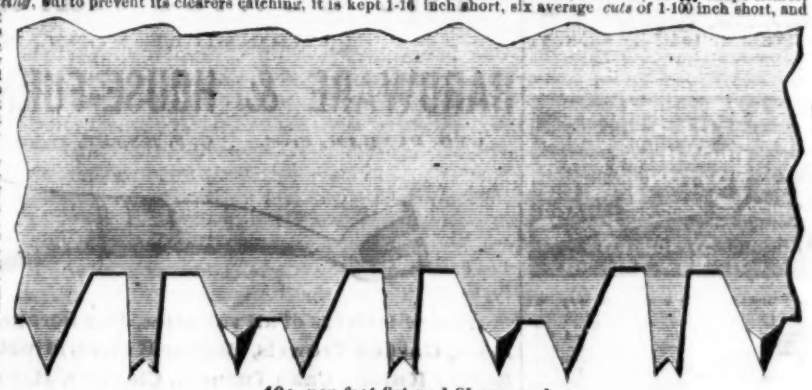
My genuine Patent Lightning Saws still lead the American market, and are shipped abroad extensively. No manufacturer dares question this or submit his saws to a public test trial. I offer $500 for expenses. My efforts within a few years have trebled the sale of Cross-Cut Saws. While I have prospered, the public have been educated in scientific timber cutting—no small thing when it is asserted that a Billion Dollars is the annual Wood, Lumber and Timber crop of America—four times the value of our wheat crop. The immense waste in cutting wood with axes is almost incredible; any one engaged in cutting cord wood will tell you that the tough and knotty timber and chips are wasted, when they may become good stove wood, if the logs are cut short with my cross-cuts, as blocks of one foot in length are *easily hauled and split.* The savings of timber and time by the scientific use of saws, it is computed, would equal the annual interest on the U. S. public debt *saved*, and the toil of millions of farmers be lightened, if they will only learn to use saws. Every clearing tooth saw has no other *cutting* teeth but the old V, and is, therefore, necessarily inferior. It has, however, an M shape clearer, and if the speed is due to one M in three teeth, why not treble the improvement by using all M teeth? A Champion Raker M does no *cutting*, but to prevent its clearers catching, it is kept 1-16 inch short, six average *cuts* of 1-100 inch short, and therefore its only mission is to remove dust that may be choking up the arches. As a shovel it is useful; but my Lightning plow teeth, *all of even length*, require no shorting or gauge, clear as they cut simultaneously, which is better than the old process of wearing off timber. *This* is why *no* manufacturer *ever has dared* test publicly against my Lightning Saw, which was awarded the highest *Silver Medal over all competitors* at last American Institute Fair, the same as usual.



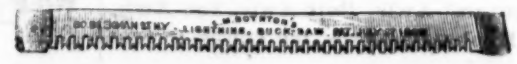
This Saw is guaranteed to cut as fast as the Diamond Cross-Cut Saw, and half as fast as the Lightning. Price, 40c. per foot, Filed and Set, made of Best Steel.

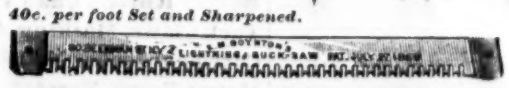


The teeth of an ordinary cross-cut saw are usually one inch dust space. If an ordinary log saw has fifty teeth employed in cutting a log, and if a progress of ¼ inch each motion is obtained, the cutting of each point would be 1-50 of ¼ inch, or 1-200 of an inch, the thickness of a very thin sheet of paper. If we allow a cut of double the amount, still but a hundredth of an inch is used. Now, by filing out the middle of my tooth, thus M it is evident the shortening of an average filing will reach up to the undulled edge, which will require but slight edging, thus saving the shape perfectly, and *economizing a square inch instead of the point of steel of other saws, or thrice the durability, without gumming, thus saving files, time and money.*



40c. per foot Set and Sharpened.





Galvanic Deposition of Bismuth.—Bertrand succeeds in obtaining a galvanic deposite of bismuth by employing a double chloride of bismuth and ammonium. This salt is white, crystalline, very soluble in water, and is not precipitated by a slight excess of hydrochloric acid. It is best to operate in the cold and with a solution of from 25 to 30 grammes of the salt in a litre. Precipitation is easily effected by a single Bunsen element; with a Daniell's it is slower. At the end of the operation the brass or copper objects have a blackish tint, below which the bismuth, which adheres firmly, appears with its characteristic lustre, midway between that of antimony and old silver. The deposit takes a fine polish. In an analogous manner a double chloride of antimony and ammonia gives a deposit of antimony.

The Origin and Growth of Engineering Science.

(Concluded.)

While the Dutch were acquiring practical knowledge in dealing with water, and we in Britain, among others, were benefiting by their experience, the disastrous results which ensued from the inundations caused by the Italian rivers of the Alps gave a new importance to the science of hydraulics. Some of the greatest philosophers of the seventeenth century—among them Torricelli, a pupil of Galileo—were called upon to advise and to superintend engineering works; nor did they confine themselves to the construction of preventive works, but thoroughly investigated the condition pertaining to fluids at rest or in motion, and gave to the world a valuable series of works on hydraulics and hydraulic engineering, which form the basis of our knowledge of these subjects at the present day.

Some of the best scientific works (prior to the nineteenth century) on engineering subjects we owe to Italian and French writers. The writings of Belidor, an officer of artillery in France in the seventeenth century, who did not, however, confine himself to military subjects, drew attention to engineering questions. Not long after their appearance, the Ponts et Chaussees were established, which has maintained ever since a body of able men specially educated for, and devoted to, the prosecution of industrial works.

The impulse given to road making in the early part of the last century soon extended to canals and means for facilitating locomotion and transport generally. Tramways were used in connection with mines at least as early as the middle of the seventeenth century, but the rails were, in those days, of wood. The first iron rails are said to have been laid in this country as early as 1738; after which time their use was gradually extended, until it became general in mining districts.

By the beginning of this century the great ports of England were connected by a system of canals, and new harbor works became necessary, and were provided to accommodate the increase of commerce and trade, which improved means of internal transport had rendered possible. It was in the construction of these works that our own Brindley and Smeaton, Telford and Rennie, and other engineers of their time, did so much.

But it was not until the steam engine, improved and almost created by the illustrious Watt, became such a potent instrument, that engineering works to the extent they have since been carried out became possible or necessary. It gave mankind no new faculty, but it at once set his other faculties on an eminence, from which the extent of his future operations became almost unlimited.

Water-mills, wind-mills and horse-machines were in most cases superseded. Deep mines, before only accessible by adits and water levels, could at once be reached with ease and economy. Lakes and fens which, but for the steam engine, would have been left untouched, were drained and cultivated.

The slow and laborious toil of hands and fingers, bone and sinew, was turned to other employments, where, aided by ingenious mechanical contrivances, the produce of one pair of hands was multiplied a thousand-fold, and their cunning extended until results marvelous, if you consider them, were attained. Since the time of Watt the steam engine has exerted a power, made conquests, and increased and multiplied the material interests of this globe to an extent which it is scarcely possible to realize.

But while Watt has gained a world-wide, well earned fame, the names of those men who have provided the machines to utilize the energies of the steam engines are too often forgotten. Of their inventions the majority of mankind know little. They worked silently at home, in the mill, or in the factory, observed by few. Indeed, in most cases these silent workers had no wish to expose their work to public gaze. Were it not so, the factory and the mill are not places where people go to take the air. How long in the silent night the inventors of these machines sat and pondered; how often they had to cast aside some long-sought mechanical movement and seek another and a better arrangement of parts, none but themselves could ever know. They were unseen workers, who succeeded by rare genius, long patience, and indomitable perseverance.

More ingenuity and creative mechanical genius is, perhaps, displayed in machines used for the manufacture of textile fabrics than by those used in any other industry. It was not until late in historical times that the manufactures of such fabrics became established on a large scale in Europe. Although in China man was clothed in silk long ago, and although Confucius, in a work written 2300 years ago, orders with the greatest minuteness the rules to be observed in the production and manufacture of silk, yet it was worth nearly its weight in gold in Europe in the time of Aurelian, whose empress had to forego the luxury of a silk gown on account of its cost. Through Constantinople and Italy the manufacture passed slowly westward, and was not established in France until the 16th century, and arrived at a still later period in this country. It is related that James V. had to borrow a pair of silk hose from the Earl of Mar, in order that he might not, as he expressed it, appear as a scrub before strangers.

So cotton, of which the manufacture in India dates from before historical times, had scarcely by the Christian era reached Persia and Egypt. Spain in the tenth and Italy in the fourteenth century manufactured it, but Manchester, which is now the great metropolis of the trade, not until the latter half of the seventeenth century.

Linen was worn by the old Egyptians, and some of their linen mummy cloths surpass in fineness any linen fabrics made in later days. The Babylonians wore linen also and wool, and obtained a widespread fame for skill in workmanship and beauty in design.

In this country wool once formed the staple for clothing. Silk was the first rival, but its costliness placed it beyond the reach of the many. To introduce a new material or improved machine into this or other countries a century or more ago was no light undertaking. Inventors and would-be benefactors alike ran the risk of loss of life. Loud was the outcry made in the early part of the eighteenth century against the introduction of Indian cottons and Dutch calicoes.

Until 1738, in which year the improvements in spinning machinery were begun, each thread of worsted or cotton wool had been spun between the fingers in this and all other countries. Wyatt, in 1738, invented spinning by rollers instead of fingers, and his invention was further improved by Arkwright. In 1770 Hargreaves patented the spinning jenny, and Crompton the mule in 1775, a machine which combined the advantages of the frames of both Hargreaves and Arkwright. In less than a century after the first invention by Wyatt, double mules were working in Manchester with over 2000 spindles. Improvements in machines for weaving were begun at an earlier date. In 1579 a ribbon loom is said to have been invented at Dantzic, by which from four to six pieces could be woven at one time, but the machine was destroyed and the inventor lost his life. In 1800 Jacquard's most ingenious invention was brought into use, which, by a simple mechanical operation, determines the movements of the threads which form the pattern in weaving. But the greatest discovery in the art of weaving was wrought by Cartwright's discovery of the power loom, which led eventually to the substitution of steam for manual labor, and enabled a boy with a steam loom to do fifteen times the work of a man with a hand loom.

Steamboats, the electric telegraph, and railways, are more within the cognizance of the world at large, and the progress that has been made in them in little more than one generation is better known and appreciated.

It is not more than 40 years since one of our scientific men, and an able one, too, declared at a meeting of this association that no steam boat would ever cross the Atlantic; founding his statement on the impracticability, in his view, of a steamboat carrying sufficient coal, profitably, I presume, for the voyage. Yet, soon after this statement was made, the Sirius steamed from Bristol to New York in 17 days, and was soon followed by the Great Western, which made the homeward passage in 13½ days, and with these voyages the era of steamboats began. Like most important inventions, that of the steamboat was a long time in assuming a form capable of being profitably utilized, and even when it had assumed such a form the objections of commercial and scientific men had still to be overcome.

The increase in the number of steamboats since the time when the Sirius first crossed the Atlantic has been very great. Whereas in 1814 the United Kingdom only possessed two steam vessels, of together 450 tons burden, in 1872 there were on the register of the United Kingdom 3662 steam vessels, of which the registered tonnage amounted to over 1,500,000 tons, or to nearly half the whole steam tonnage of the world, which did not at that time greatly exceed 3,000,000 tons.

As the number of steamboats has largely increased, so also gradually has their size increased until it culminated in the hands of Brunel in the Great Eastern.

A triumph of engineering skill in shipbuilding, the Great Eastern has not been commercially so successful. In this, as in many other engineering problems, the question is not how large a thing can be made, but how large, having regard to other circumstances, it is proper at the time to make it.

If, as regards the dimensions of steamboats, we have at present somewhat overstepped the limits in the Great Eastern, much still remains to be done in perfecting the form of vessels, whether propelled by steam or driven by the force of the wind. A distinguished member of this association, Mr. Froude, has now for some years devoted himself to investigations carried on with a view to ascertain the form of vessel which will offer the least resistance to the water through which it must pass. So many of us in these days are called upon to make journeys by sea as well as by land, that we can well appreciate the value of Mr. Froude's labors, so far as they tend to curtail the time which we must spend on our ocean journeys; and we should all feel grateful to him if from another branch of his investigations, which relates to the rolling of ships, it should result that the movement in passenger vessels could be reduced.

As improvements in the form of the hull are effected, less power—that is, less fuel—will be required to propel the vessel through the water for a given distance. Great as have been the improvements effected in marine engines to this end, much still remains to be done. Wolf's compound engine, so long overlooked, is, with some improvements, being at last applied. Whereas the consumption of fuel in such vessels as the Himalaya used to be from 5 to 6 lbs. of fuel per effective horse-power, it has been reduced, by working steam more expansively in vessels of a later date, to 2 lbs. Yet, comparing this with the total amount of energy of 2 lbs. of coal, it will be found that not a tenth part of the power is obtained which that amount of coal would theoretically call into action.

There is no more remarkable instance of the rapid utilization of what was in the first instance regarded by most men as a mere scientific idea, than the adoption and extension of the electric telegraph.

Those who read Odier's letters written in 1773, in which he made known his idea of a telegraph which would enable the inhabitants of Europe to converse with the Emperor of Mogul, little thought that in less than a century a conversation between persons at points so far distant would be possible. Still less did those who saw in the following year messages sent from one room to another by Lesage in the presence of Friedrich of Prussia, realize that they had before them the germ of one of the most extraordinary inventions among the many that will render this century famous.

I should weary you were I to follow the slow steps by which the electric telegraph of to-day was brought to its present state of efficiency. In the present century few years have passed without new workers appearing in the field; some whose object was to utilize the new found power for the benefit of mankind, others—and their work was not the least important in the end—whose object was to investigate magnetism and electrical phenomena as presenting scientific problems still unsolved. Galvani, Volta, Oersted, Arago, Sturgeon and Faraday, by their labors, helped to make known the elements which rendered it possible to construct the electric telegraph. With the battery, the electric coil, and the electro-magnet, the elements were complete, and it only remained for Sir Charles Wheatstone and others to combine them in a useful and practically valuable form. The inventions of Alexander, Steinhill and those of similar nature to that of Sir Charles Wheatstone, were made known at a later date in the same year, which will ever be memorable in the annals of telegraphy.

The first useful telegraph was constructed upon the Blackwall Railway in 1838, Messrs. Wheatstone's and Cooke's instruments being employed. From that time to this the progress of the electric telegraph has been so rapid, that at the present time, including land lines and submarine cables, there are in use in different parts of the world not less than 400,000 miles of telegraph.

Among the numerous inventions of late years, the automatic telegraph of Mr. Alexander Bain, of Dr. Werner Siemens and of Sir Charles Wheatstone, are especially worthy of notice. Mr. Bain's machine is chiefly used in the United States, that of Dr. Werner Siemens in Germany. In this country the machine invented by Sir Charles Wheatstone, to whom telegraphy owes so much, is chiefly employed. By his machine, after the message has been punched out in a paper ribbon by one machine on a system analogous to the dot and dash of Morse, the sequence of the currents requisite to transmit the message along the wire is automatically determined in a second machine by this perforated ribbon. This second operation is analogous to that by which, in Jacquard's loom, the motions of the threads requisite to produce the pattern is determined by perforated cards. By Wheatstone's machine errors inseparable from manual labor are avoided; and what is of even more importance in a commercial point of view, the time during which the wire is occupied in the transmission of a message is considerably diminished.

By the application of these automatic systems to telegraphy, the speed of transmission has been wonderfully accelerated, being equal to 200 words a minute—that is, faster than a short-hand writer can transcribe; and, in fact, words can now be passed along the wires of land lines with a velocity greater than can be dealt with by the human agency at either end.

Owing partly to the retarding effects of induction and other causes, the speed of transmission by long submarine cables is much smaller. With the cable of 1858 only 2⅓ words per minute were got through. The average with the Atlantic cable, Dr. C. W. Siemens informs me, is now 17 words, but 24 words per minute can be read.

One of the most striking phenomena in telegraphy is that known as the duplex system, which enables messages to be sent from each end of the same wire at the same time. This simultaneous transmission from both ends of a wire was proposed in the early days of telegraphy, but, owing to imperfect insulation, was not then found to be practicable; but since then telegraphic wires have been better insulated, and the system is now becoming of great utility, as it nearly doubles the capacity for work of every wire.

Of railways the progress has been enormous, but I do not know that in a scientific point of view a railway is so marvelous in its character as the electric telegraph. The results, however, of the construction and use of railways are more extensive and widespread, and their utility and convenience brought home to a larger portion of mankind. It has come to pass, therefore, that the name of George Stephenson has been placed second only to that of James Watt; and as men are, and will be, estimated by the advantages which their labors confer on mankind, he will remain in that niche, unless, indeed, some greater luminary should arise to outshine him. The merit of George Stephenson consisted, among other things, in this—that he saw more clearly that any other engineer of his time the sort of thing that the world wanted, and that he persevered, in spite of learned objectors, with the firm conviction that he was right and they were wrong, and that there was within himself the power to demonstrate the accuracy of his conviction.

We who live in these days of roads and railways, and can move with a fair degree of comfort, speed and safety, almost where we will, can scarcely realize the state of England two centuries ago, when the years of opposition which preceded the era of coaches began; when, as in 1662, there were but six stages in all England, and John Crossdell, of the Charter-house, thought there were six too many; when Sir Henry Herbert, a member of the House of Commons, could say, "If a man were to propose to carry us regularly to Edinburgh in coaches in seven days, and bring us back in seven more, should we not vote him to Bedlam?"

In spite of short-sighted opposition, coaches made their way, but it was not till a century later, in 1784—and then, I believe, it was in this city of Bristol—that coaches were first established for the conveyance of mails. Those here who have experienced, as I have, what the discomforts were of long journeys inside the old coaches, will agree with me that they were very great; and I believe, if returns could be obtained of the accidents which happened to coaches, it would be found that many more people were injured and killed, in proportion to the number that traveled by that mode, than by the railways of to-day.

No sooner had our ancestors settled down with what comfort was possible in their coaches, well satisfied that twelve miles an hour was the maximum speed to be obtained or that was desirable, that they were told that steam conveyance on iron railways would supersede their "present pitiful" methods of conveyance. Such was the opinion of Thomas Gray, the first promoter of railways, who published his work on a general iron railway in 1819. Gray was looked on as little better than a madman.

Railways add enormously to the national wealth. More than 25 years ago it was proved to the satisfaction of a committee of the House of Commons, from facts and figures which I then adduced, and the Lancashire and Yorkshire Railway, of which I was the engineer, and which then formed the principal railway connection between the populous towns of Lancashire and Yorkshire, effected a saving to the public using the railway of more than the whole amount of the dividend which was received by the proprietors. These calculations were based solely on the amount of traffic carried by the railway, and on the difference between the railway rate of charge and the charges by the modes of conveyance anterior to railways. No credit whatever was taken for the saving of time, though in England pre-eminently time is money.

Considering that railway charges on many items have been considerably reduced since that day, it may be safely assumed that the railways in the British Islands now produce, or rather save to the nation, a much larger sum annually than the gross amount of all the dividends payable to the proprietors, without at all taking into account the benefit arising from the saving in time. The benefits under that head defy calculation, and cannot with any accuracy be put into money; but it would not be at all over estimating this question to say that in time and money the nation gains at least what is equivalent to 10 per cent. on all the capital expended on railways. I do not urge this on the part of railway proprietors, for they did not embark in these undertakings with a view to the national gain, but for the expected profit to themselves. Yet it is as well it should be noted, for railway proprietors appear sometimes by some people to be regarded in the light of public enemies.

It follows from these facts that whenever a railway can be made at a cost to yield the ordinary interest of money, it is in the national interest that it should be made. Further, that though its cost might be such as to leave a smaller dividend than that to its proprietors, the loss of wealth to so small a section of the community will be more than supplemented by the national gain, and therefore there may be cases where a government may wisely contribute in some form to undertakings which, without such aid, would fail to obtain the necessary support.

Mr. Bramwell, when presiding over the Mechanical Section at Brighton, drew attention to the waste of fuel.

Dr. Siemens, in an able lecture he delivered by request of the Association to the operative classes at the meeting at Bradford, pointed out the waste of fuel in special branches of the iron trade, to which he has devoted so much attention.

He showed on that occasion that, in the ordinary reheating furnace, the coal consumed did not produce the twentieth part of its theoretical effect, and in melting steel in pots in the ordinary way not more than one-seventieth part; in melting one ton of steel in pots about 2½ tons of coke being consumed. Dr. Siemens further stated that, in his regenerative gas furnace, one ton of steel was melted with 12 cwt. of small coal.

Mr. Lowthian Bell, who combines chemical knowledge with the practical experience of an iron master, in his presidential address to the members of the Iron and Steel Institute in 1873, stated that, with the perfect mode of withdrawing and utilizing the gases and the improvement in the furnaces adopted in the Cleveland district, the present make of pig iron in Cleveland is produced with 3½ million tons of coal less than would have been needed fifteen years ago; this being equivalent to a saving of 45 per cent. of the quantity formerly used. He shows, by figures, with which he has favored me, that the calorific power of the waste gases from the furnaces is sufficient for raising all the steam and heating all the air the furnaces require.

It has already been stated that by working steam more expansively, either in double or single engines, the consumption of fuel in improved modern engines compared with the older forms may be reduced to one-third.

All these reductions still fall far short of the theoretical effect of fuel which may be never reached. Mr. Lowthian Bell's figures go to show that in the interior of the blast furnace, as improved in Cleveland, there is not much more to be done in reducing the consumption of fuel; but much has already been done, and could the reductions now attainable, and all the information already acquired be universally applied, the saving in fuel would be enormous.

If I have pointed out that we do not avail ourselves more than a fractional part of the useful effects of fuel, it is not that I expect we shall all at once mend our ways in this respect. Many cases of waste arise from the existence of old and obsolete machines, of bad forms of furnaces, of wasteful grates, existing in most dwelling houses; and these are not to be remedied at once, for not every one can afford, however desirable it might be, to cast away the old and adopt the new.

In looking uneasily to the future supply and cost of fuel, it is, however, something to know what may be done even with the application of our present knowledge; and could we apply it universally to-day, all that is necessary for trade and comfort could probably be as well provided for by one-half the present consumption of fuel; and it behoves those who are beginning to build new mills, new furnaces, new steamboats or new houses, to act as though the price of coal which obtained two years ago had been the normal and not the abnormal price.

"Whence and whither," is an aphorism which leads us away from present and plainer objects to those which are more distant and obscure; whether we look backward or forward, our vision is speedily arrested by an impenetrable veil.

On the subjects I have chosen you will probably think I have traveled backward far enough. I have dealt to some extent with the present.

The retrospect, however, may be useful to show what great works in former ages.

Some things have been better done than in those earlier times, but not all.

In what we choose to call the ideal we do not surpass the ancients. Poets and painters and sculptors were as great in former times as now; so, probably, were the mathematicians.

In what depends on the accumulation of experience, we ought to excel our forerunners. Engineering depends largely on experience; nevertheless, in future times, whenever difficulties shall arise or works have to be accomplished for which there is no precedent, he who has to perform the duty may step forth from any of the walks of life, as engineers have not unfrequently hitherto done.

The marvelous progress of the last two generations should make everyone cautious of predicting the future. Of engineering works, however, it may be said that their practicability or impracticability is often determined by other elements than the inherent difficulty in the works themselves. Greater works than any yet achieved remain to be accomplished—not perhaps yet awhile. Society may not yet require them; the world could not at present afford to pay for them.

The progress of engineering works, if we consider it, and the expenditure upon them, has already in our time been prodigious. One hundred and sixty thousand miles of railway alone, put into figures at £30,000 a mile, amounts to 3200 million pounds sterling; add 400,000 miles of telegraph at £100 a mile, and 100 millions more for sea canals, docks, harbors, water and sanitary works constructed in the same period, and we get the enormous sum of 3340 millions sterling expended in one generation and half on what may, undoubtedly, be called useful works.

The wealth of nations may be impaired by expenditure on luxuries and war; it cannot be diminished by expenditure on works like these.

As to the future we know we cannot create a force; we can, and no doubt shall, greatly improve the application of those with which we are acquainted. What are called inventions can do no more than this, yet how much every day is being done by new machines and instruments.

The telescope extended our vision to distant worlds. The spectroscope has far outstripped that instrument, by extending our powers of analysis to regions as remote.

Postal deliveries were and are great and able organizations, but what are they to the telegraph?

Need we try to extend our vision into futurity farther? Our present knowledge, compared to what is unknown even in physics, is infinitesimal. We may never discover a new force—yet, who can tell?

A Japanese War Vessel.—The San Francisco *Commercial Herald* says: The Japanese war steamer Tsukuba arrived December 14th from Tokio, after a passage of 37 days, made under sail. The Tsukuba is a training ship for cadets in the Imperial Navy of Japan. She is 1033 tons burden, carries 12 guns, and has engines of 200 horse-power. Her principal officers are: T. Y. Ito, captain, and T. Y. Fukumura, commander, under whom are 25 officers, 36 cadets, 232 seamen, and 17 marines. The English instructors on board are J. W. Austin, E. Yeo, and W. Woodward. She left Tokio (Yeddo Bay) on November 6th, and encountered very severe weather during the passage to this port. This steamer was one of the squadron sent to Formosa (China) in 1874 to punish the natives of that island for massacreing some Japanese seamen who had been wrecked there. The only other war steamer belonging to Japan that has visited the United States before this, was the steamer Candimarrah, which arrived at this port on the 17th of March, 1860. The Tsukuba will first be put in perfect order, and then will probably be open to the inspection of visitors, due announcement of which will be published in the papers. No visitors will at present be allowed on board without a pass signed by the Japanese Consul. The vessel is square-rigged, is 197 feet over all, and has 28¼ feet beam.

BUSINESS ITEMS.

MASSACHUSETTS.

S. C. Smith, Lowell, makes a specialty of forged cap and set screws. A year ago he invented a power hammer for forging cap screws, making the shanks of any length, and the heads of any size or style. They are worked under a welding heat, drawn down from a rod or wire the size of the head. The operation is simple, unique, rapid and uniform. The excess of matter is thrown into the diameter, and, after sufficient up-set has been made, the up-set hammer, by a lever movement, is taken off and the side hammers put on, leaving the head uniform in diameter, all the corners strong and sharp, with a solidity perfectly central, the whole shape being as true as it could have been milled or slotted. He has also invented a device to simplify the finishing on an engine lathe, whereby the screw is cut or the head polished, and without checking the speed of the lathe.

RHODE ISLAND.

William Newell & Son, Central Falls, employ 8 men making bronze and metal castings. Their shop has a capacity of 3000 pounds a week. They recently finished a contract for the castings for the Providence Water Works, using up 130,000 pounds of gun metal. They make a specialty of globe steam valves and similar fine work.

The American File Company, Pawtucket, are turning out 400 doz. files a day, all made by machinery, from the smallest to the heaviest. They are having a small but increasing export demand, while the home consumption of their goods is growing each year.

William T. Smith, Providence, makes a specialty of pure gold, silver and copper, black lead and acids, &c. He commenced the business of assayer, refiner and sweep smelter in 1855, and rebuilt in brick and thoroughly refitted his works in 1871. His main building is 30x80, 2 stories, with a rear L, 30x50. He has two of the largest sized smelting furnaces, and furnaces with a capacity of burning 25 barrels a day. His grinding mills work up a ton a day. He makes a ton a week of blue vitriol or sulphate of copper from the refuse liquors from refining jewellers' plate clippings.

NEW YORK.

Waters & Son, the paper boat builders, of Troy, have completed six boats for the Centennial Exhibition. They comprise a six oared gig, four-oared shell, a double scull, two single shells and one pleasure gig. The boats are models in their way.

The Bellmont Iron Works, situated at Bellmont, Franklin county, were built in 1875 by Messrs. Pope, Williams & Co. The post office address is Chateaugay Lake, Franklin county. The works embrace 2 forges, containing 10 fires, with two more in course of construction, and have a capacity of 4000 net tons per annum of charcoal blooms and billets, suitable for conversion into cast steel or for drawing into wire. The iron they make is of excellent quality, analyzing as follows:

Silica	·013
Carbon	·220
Phosphorus	·011
Sulphur	trace.
Iron	99·610
Slag	·150
	100·004

NEW JERSEY.

They have shut down for an indefinite time at the Delaware Rolling Mill, Phillipsburg, throwing a large number of men out of employment.

PENNSYLVANIA.

Porter, Bell & Co. recently shipped one of their narrow gauge locomotives to Cincinnati, for the suburan railroad in that city, also one for the suburban road at St. Louis.

The Keystone Flint Glass Works are running about three-fourths full. These works were overhauled last July, and new furnaces built, which improvement vastly increases the general facilities for the manufacture of flint glassware, which is the only kind of ware made at these works, and is of fine quality. The company is quite busy at this time, with fair prospects for the coming season.

Messrs. Campbell, Jones & Co. have commenced the manufacture of glass journal boxes. The glass of which these boxes are made is of a special "mix," which renders them as much stronger than if made of ordinary glass as three is to one. A box made of ordinary glass was submitted to hydraulic pressure, and cracked at 10,000 pounds, but one made of the special "mix" required a pressure of 27,300 pounds to shatter it. A few boxes have been applied to street cars, and thus far they give excellent satisfaction. Although the idea of making glass journal boxes is not a new one, yet it is said this is the first instance of their being successfully made.

The Pittsburgh Steel Casting Company having one of their 24-pot furnaces to rebuild, gas was shut off at 6·30 a. m., and at 12 m. of the same day the work was finished and the gas turned on again. This was a feat performed by the Messrs. Swindel Brothers, of Allegheny City, (agents and builders of the Siemens-Martin furnace). The job reflects much credit upon this firm and their employes, both as to skill and rapidity of workmanship. The above works are so rushed with work that it is necessary to have repairs done very rapidly in order to cause the least possible delay in their extensive operations.

The Pittsburgh and McKeesport Car and Locomotive Works shipped on the 9th of December a light locomotive for the St. Johns Railway Company, at St. Augustine, Florida. This is the second engine of this class made at the above works for the St. Johns Railway Company. The St. Johns Railway runs between St. Augustine and Tocoy on the St. Johns River, points visited very extensively by people of the Northern States. The Pittsburgh and McKeesport Works has a fair prospect for spring work. Mr. John F. Dravo is now president of the company; R. C. Loomis, treasurer, and J. N. Shallenberger, superintendent. Their office is at 81 Fourth avenue, Pittsburgh, and works at McKeesport.

William Clark & Co., of Pittsburgh, have been making the experiment of fabricating hoop "iron" from Bessemer steel rail ends, and with entire success. The hoops thus made are very tough, and may be bent back and forth for an indefinite number of times without showing the least evidence of fracture. The "ends" were from the Edgar Thomson Steel Works.

An order from Bavaria, Germany, for a bark mill, has lately been received by William F. Mosser & Co., Allentown.

The Charlotte Furnace, at Scottdale, Westmoreland county, is again in blast.

The Baldwin Locomotive Works, Philadelphia, are in operation night and day, and some 500 additional men have been employed.

The Susquehanna Iron Company, of Columbia, are pressed with orders from their regular trade, running double turn, which is very unusual at this season.

The Pittsburgh *Commercial* has the following items: It is said the stock is all subscribed for the nail mill to be built at the junction of the Mt. Pleasant and Southwest Pennsylvania Railroad, and it will likely be built this winter.

A Cleveland, Ohio, man is making arrangements to start in North East, Erie county, a novelty iron works for the manufacture of various small articles of household use.

The Phœnix Iron Company, of Phœnixville, have just erected a segment punching machine that will punch all the segments of the iron columns, for which it is used, at once. It is the invention of Mr. R. H. Davies, master machinist of the establishment.

The iron industries of Pottstown are said to be in a flourishing condition. The works of the Pottstown Iron Company, consisting of two rolling mills, a nail factory and a blast furnace, are in steady operation, with prospects of continuing for some time. The rolling mill of Messrs. Potts Brothers has been running regularly for some six weeks, while work is rapidly going on toward the hasty completion of the mammoth blast furnace of the Warwick Iron Company, which, when finished, will immediately "blow in." In addition to this cheering outlook is the erection of the new mill of the Glascow Iron Company, work on which is being pushed forward as rapidly as possible.

Riehle Bros., of Philadelphia, are putting in a track scale for the Philadelphia & Reading road at Cresonia station. It is 100 feet long; capacity, 200,000 pounds.

We are advised by Edward C. Lynde, Esq., secretary, that the Lackawanna Iron and Coal Co. rolled their first Bessemer steel rail in their new works at Scranton on Wednesday, December 29th, ultimo. This makes 10 Bessemer steel establishments that are now completed and in operation in this country, the total annual capacity of which exceeds 400,000 gross tons of ingots. The Vulcan Iron Works, at St. Louis, will next summer increase this capacity to 500,000 tons.

The product of the Cambria Steel Works for the year ending December 31, 1875, was 55,525 180-2240 tons of steel. This is the largest output, by many thousand tons, of any 5-ton plant in the world, and reflects the greatest credit upon the management.—*Johnstown Tribune.*

The proprietors of the Pencoyd Iron Works have just concluded an amicable readjustment of wages with their workmen, resulting in a decrease of from 3 to 10 per cent. The greatest decrease is in puddling, which is reduced from $4·65 to $4·25 per ton, with nothing out of the office to the helpers.

OHIO.

The Ætna Iron and Nail Company, will run their works located at Bridgeport, opposite Wheeling, double turn upon the opening of the new year.

It is reported that the Russia Mill, Niles, is running up to its full capacity, with sufficient orders to keep it running for some time to come.

The Portsmouth *Republican* says: It is affirmed on good authority that Clinton Furnace will go into blast again the coming season, and test at the same time the quality of the newly discovered coal on their lands in producing iron. There is a stratum of 10 feet, in which there is, first a five foot vein of coal, under which three feet of slate is found. Below the slate two feet of good coal is again found.

The Rolling Mill at Pomeroy is now running constantly, giving employment to a large number of men. The managers report that the iron business has been looking up some of late. They have orders for all the bar iron they can make. They are shipping large lots to Indianapolis, New Orleans, and other points south and west.

The Cleveland *Trade Review* says that the warm weather has a depressing effect on the saw manufacturers who have a stock of ice tools on hand.

D. Price & Sons, Cleveland, saw manufacturers, have recently received an inquiry with regard to their stave sawing machinery from parties in Bolinas, Sweden.

The Globe Iron Works are building a large steel boiler five feet in diameter for the Cleveland linseed oil works, Griswold & Dunham, to replace two smaller ones.

The mining machinery purchased through the agency of Messrs. Pratt and Armstrong, of Cleveland, by the Mona Silver Mining Company, to be used in their Utah mines, and which was shipped a few weeks since, is now in Salt Lake City, 45 miles from the company's mines, where it will remain until the heavy snows on the mountain will permit of its being carried forward. The mines are said to be of great richness. The stock of the company is largely owned in Cleveland.

Manning & Sons, Cleveland, are preparing for the second casting of the cylinder for the shaft of the new water works tunnel. The *rade Review*, of the 5th, says: The casting will be made this week. The large additional space which they have roofed over is ready for the reception of the machinery, which will not, however, be placed until next spring. This firm has been doing considerable repairing and rebuilding of steam fire engines.

MISSOURI.

A company has been formed and the manufacture of cement begun near Boonville.

The Carondelet Knobbling Furnace, of Zeitinger & Zoppi, is at work on full turn, with a fair turnout of blooms. The annual capacity of this establishment is 1500 tons of blooms; the present year's production will not exceed 500 tons. The market for billets and blooms is very dull at this time, with low prices. Twenty-five hands are employed.

Collins & Halliday, St. Louis, have nearly completed the great crane for the Vulcan Iron Works.

At the Carondelet Zinc Works four furnaces are running, with a daily yield of 7600 pounds of slab zinc. There are 352 retorts in the block. The ore used is from the Valle Mine and Granby. Fifty-five men are employed.

The roofs are rapidly going on the building for the new Vulcan Bessemer Mill. All the brick work is done. The contracts for the construction of the furnaces are not yet given out. Three Siemens furnaces are to be constructed. The boilers are all going in place as rapidly as they can be set.

The South St. Louis Iron Company is now in the receipt of a full supply of coke, and intend to run uninterruptedly during the winter. The present furnace yield on No. 2 is 45 tons of No. 1 Bessemer pig.

The Missouri Furnace Company, Carondelet, is running only one furnace, with a daily yield of 36 tons, from Meramec and Southwest ores. Of the turnout 92 per cent. is foundry 1 and 2, the balance mill. One hundred and twenty men are employed.

INDIANA.

The Indianapolis Rolling Mill is now turning out over 2000 tons of rails per week. These employ about 600 hands, and the pay-roll amounts to about $25,000 per month. The company have erected buildings for the purpose of commencing the manufacture of steel in the spring.

MICHIGAN.

The work of erecting a whim and other hoisting machinery has been going on during the past week at the shaft of the Eureka Mine two miles west of the city. It is the intention of the managers to have everything in readiness for mining in a few days, but unless sales or advances can be obtained on the ore as mined operations will not be continued. A verbal contract was made sometime since with C. Donkersly, of the Morgan Furnace, for a considerable quantity of the ore, but the early blowing out of that stack will necessarily annul the contemplated sale. The ore of the Eureka Mine is a hard blue hematite, carrying a high percentage of metallic iron. The width of the vein, however, is not great, although indications are that it has a tendency to widen at the base.—*Marquette Mining Gazette.*

WISCONSIN.

The Milwaukee Iron Works annually consume 60,000 tons bituminous coal, 7800 tons anthracite coal, 50,000 tons coke, 28,000 tons Iron Ridge and similar ore, 18,500 tons Lake Superior ore, 22,000 tons limestone; and they yield a product of 33,000 tons pig iron, 44,000 tons rails, 15,000 tons merchant iron, 9000 tons fish plates and 2400 tons of car links and pins.

The iron works in West Depere are in operation again with a limited force of men, turning out agricultural machines.

Special Notices.

Trade Report.

Office of THE IRON AGE,
WEDNESDAY EVENING, Jan. 12, 1876.

During the past week there has been a decided improvement in the tone of the several financial markets. The money market has been to some extent manipulated by stock speculators, and the rates on call loans have advanced from 5 @7 per cent. to 7 @ 7 per cent., gold.

The banks have received considerable currency during the week, and are in a position to increase their loans, but, for the reasons mentioned, borrowers have not been able to obtain any advantage from the more favorable condition of the market.

In the gold market there has been an abundant supply of cash coin, and the premium has ranged between 112⅝ and 113⅛. The nominal rates for foreign exchange are 4·84 @ 4·84½ and 4·88 @ 4·88½ for prime bankers' sterling. The following table shows the daily range of the premium since our last report:

	Highest.	Lowest.
Thursday	112¾	112⅝
Friday	113	112⅝
Saturday	113⅛	113
Monday	113⅛	113
Tuesday	113⅛	112¾
Wednesday	113⅛	112¾

Government bonds have been strong here and stronger in London. Investment securities are in good demand, especially desirable railway mortgages. We give below the closing quotations of governments.

The stock market has been strong in the main, and prices of leading shares have advanced. The principal dealings have been in Western Union, Lake Shore, St. Paul, Pacific Mail, Michigan Central and Northwestern. We give below the prices of active shares at the close of business to-day.

The movements in foreign trade since our last report are shown in the following tables:

IMPORTS.

For the week ended Jan. 8:

1874.	1875.	1876.
$7,954,124	$5,803,864	$7,528,539

Among the imports of general merchandise were articles valued as follows:

	Quant.	Value.
Anvils	96	$668
Brass goods	4	3,852
Bronzes	22	2,753
Chains and anchors	118	5,600
Copper	..	365
Cutlery	77	21,686
Gas fixtures	3	1,462
Guns	14	3,035
Hardware	14	846
Iron, pig, tons	500	9,361
Iron, sheet, tons	74	6,136
Iron, cotton ties	826	2,335
Iron, other, tons	833	58,073
Metal goods	167	12,328
Needles	11	5,269
Old metal	..	2,402
Platina	1	377
Per. caps	4	847
Steel	2,193	28,311
Tin, boxes	25,691	157,079
Tin, bbls	5	449
Tin, 5363 slabs	489,171	87,511
Wire	175	2,980
Zinc	100,760	6,464

EXPORTS OF SPECIE.

For the week ended Jan. 8:

Total for the week	$46,704
Same time in 1875	33,602
Same time in 1874	26,312
Same time in 1873	15,590
Same time in 1872	45,702

The bank statement shows an increase in total reserve of $3,320,000, composed of a gain of $3,916,300 in specie, less a loss of $596,300 in legal tender notes. The deposits increased $6,242,100; of this amount only $2,696,300 can be accounted for by the changes in the items of loans, legal tenders, gold and circulation; so that the inference is that the banks gained over $4,000,000 of national bank note currency. The banks now hold $10,773,150 surplus reserve, which is $1,759,475 more than last week. The following is a comparison of the bank averages for the past two weeks:

	Dec. 31.	Jan. 8.	Differences.
Loans	$364,052,500	$363,044,000	Dec.. $1,018,500
Specie	20,233,300	24,149,600	Inc.. 3,916,300
Legal tend's	39,924,900	39,328,600	Dec... 596,300
Deposits	204,578,100	210,820,200	Inc.... 6,242,100
Circulation	18,791,000	18,593,800	Dec... 195,200

Government bonds at the close were quoted as follows:

	Bid.	Asked.
U. S. Currency 6's	122½	123
U. S. 6s 1881, reg	119⅝	120
U. S. 6s. 1881, cou	120½	121
U. S. 5-20 1864, reg (Called)	114	114⅛
U. S. 5-20 1864, cou (Called)	114	114⅛
U. S. 5-20 1865, reg	116½	116⅝
U. S. 5-20 1865, cou	116½	116⅝
U. S. 5-20 1865 new reg	117⅜	117⅝
U. S. 5-20 1865, cou	117⅜	117⅝
U. S. 5-20 1867, reg	119½	119⅝
U. S. 5-20 1867, cou	119¾	120
U. S. 5-20 1868, reg	120	120⅛
U. S. 5-20 1868, cou	120½	121
U. S. 10-40 reg	117½	117⅝
U. S. 10-40 cou	118⅜	118⅝
U. S. 5s. 1881, reg	116⅛	116⅜
U. S. 5s, 1881, cou	116⅛	116⅜

The following are the closing quotations of active stocks:

	Bid.	Asked.
Atlantic & Pacific R. R. Preferred	4⅜	5
Atlantic and Pacific Telegraph	18½	19
Chicago & Northwestern	40¾	40¾
" " Pref	88½	89
Chicago, Rock Island and Pacific	106⅜	106½
Chic., Bur. & Quincy	115¾	115½
Col., Chic. & Ind. Cent	3⅞	3¾
Clev., Col., Cin. & Ind's	60¾	61
Cleveland and Pittsburgh	99	99¼
Chicago & Alton	100	101
" " Pref	107	108
Consolidation Coal	47¾	48⅛
Canton	38	44
Del. Lack. and Western	118	118½
Delaware & Hudson Canal	124¼	125
Dub. and Sioux City	70	—
Adams Express	103	104
American Express	58	58¼
United States Express	61½	62
Wells, Fargo & Co. Express	82	83
Erie	15⅜	15⅝
" " Preferred	29⅞	30⅛
Harlem	133½	134
Hannibal & St. Joseph	19⅜	20
" " Pref	27⅜	27¾
Illinois Central	99⅛	99⅜
Kansas Pacific	12⅝	13
Kansas & Texas	7⅛	7⅜
*Lake Shore	63½	63¾
Michigan Central	58¼	58⅜
Morris & Essex	102½	103⅜
Milwaukee & St. Paul	87⅛	87⅜
" " Pref	70¾	71
Mariposa	8¾	9¼
" Pref	9¾	11
New York Central	106⅝	107
New Jersey Central	103	103½
Ohio & Mississippi	17⅝	17⅞
Pacific Mail	37½	37⅝
Panama	128	135
Pittsburgh & Fort Wayne	99	100
Pacific of Missouri	11⅜	11½
Quicksilver	17⅝	18
" Pref	24	25
St. Louis and Iron Mountain	15⅜	15⅝
St. L., Kan. City Northern	4½	5
" Pref	22¾	24
Tol., Wabash & Western	3½	3⅝
Union Pacific	71¾	71⅝
Western Union Telegraph	72⅝	75¾

* Ex dividend.

Westward Freight Rates by Rail.

On Monday last a new freight tariff went into effect on all the roads connecting New York with the West. The new rates are the same as those charged on freights from Boston to the same points. It is understood that these rates will not be increased during the winter, and that a material reduction may be expected in the spring:

	Class. 1st.	2d.	3d.	4th.	Sp'l.
Bloomington, Ill	$1·10	$1·00	$0·83	$0·63	$0·52
Chicago, Ill	·75	·70	·60	·45	·35
Cincinnati, Ohio	·70	·64	·55	·41	·33
Cairo, Ill	·96	·90	·77	·58	·45
Columbus, O	·60	·56	·48	·36	·28
Dayton, O	·66	·61	·52	·39	·31
Evansville, Ind	·92	·85	·72	·55	·43
Fort Wayne, Ind	·65	·61	·52	·39	·30
Grand Rapids, Mich	·75	·70	·60	·45	·35
Indianapolis, Ind	·71	·66	·57	·43	·33
Keokuk, Iowa	1·10	1·00	·85	·65	·53
Kansas City, Mo	1·65	1·40	1·10	·85	·70
Kalamazoo, Mich	·70	·66	·56	·42	·33
Louisville, Ky	·86	·81	·71	·55	·44
Logansport, Ind	·71	·10	·56	·42	·33
Lafayette, Ind	·74	·69	·59	·44	·34
Milwaukee, Wis	·75	·70	·60	·45	·35
Memphis, Tenn	1·30	1·10	·95	·72	·57
Nashville, Tenn	1·08	·95	·82	·63	·50
Newark, O	·60	·56	·48	·36	·28
Pittsburgh, Pa	·45	·40	·35	·30	·20
Peoria, Ill	1·00	·90	·76	·57	·45
Quincy, Ill	1·10	1·00	·85	·65	·58
Richmond, Ind	·70	·64	·55	·41	·32
St. Louis, Mo	·97	·91	·79	·61	·49
Terre Haute, Ind	·77	·72	·61	·46	·36
Zanesville, O	·57	·53	·46	·34	·27

GENERAL HARDWARE.

We are unable to report any increase in the volume of business, and the changes in lists and discounts which have occurred since our last writing are few. In Foreign Hardware we hear of a slight improvement in the demand for heavy goods, owing partly to the favorable rates established by the transportation companies. There is no change in values to report.

Considering the season, the demand for Nails is fair. The price is altogether in buyers' favor, and we hear of no disposition to force sales, and a positive refusal to accept contracts at present prices for future delivery. We quote 10d., in small lots, at $2·90, net. Orders for 200 kegs and over could be placed at a shade better.

The Russell & Erwin Mfg. Co. have reduced the price of the Novelty Barn Door Hangers to discount 40 per cent. They also quote Fitch's Curry Combs discount 25 and 10 per cent.

In our last issue we published Henry Disston & Sons' discount sheet, which was issued under date of 1st inst., and remarked that the discount off Hand, Panel and Rip Saws was increased from 12½ to 15 per cent. We should have added the following, which we take from their notice to the jobbing trade:

"Parties 'east' of the line of Pittsburg and Buffalo will be required to sell goods at a discount not greater than 15 per cent."

"Parties 'in' Pittsburgh, Buffalo, and "West" of the line will be required to sell goods at a discount not greater than 12½ per cent."

Their advertisement on page 29 appears this week in a new dress, and to it we invite the attention of our readers.

The Pump Manufacturers' Association of the United States will meet in convention on Wednesday, the 19th inst., at the Palmer House, Chicago, to regulate prices for the present year. We are informed that at the low prices which ruled during the past year the business has been an unprofitable one. We learn that there is a general disposition on the part of the manufacturers of Augers and Bits to advance prices. Although our quotations of these goods are unaltered, the market is firmer than it has been for some time.

Hermann Boker & Co., proprietors of the Trenton Vise and Tool Works, are preparing a revised price list of the goods manufactured by them at the above mentioned establishment, including Solid Box Vises, Picks, Mattocks, Hammers, Sledges and other tools. They have in store their improved 1876 pattern Solid Box Vise, which they claim is the strongest Vise in the market, being manufactured throughout of wrought iron. They have also in stock an assortment of their Patent Pruning Shears (an illustration of which will be found in their advertisement on the 3d page), and "The Eureka Nipper." For these goods they have issued the following list, which is subject to discount 25 per cent. For quantity orders an extra discount is allowed:

Patent Pruning Shears.

No. 1, with Swivel Blade	Per doz. $9·50
No. 2, " Stationary Blade	" 9·00

The Swivel Blade Shears differ from those now in use, in the construction of the cutter, which is attached to the jaw by a pivot screw and moved by the motion of the handle, thus giving to the blade a draw cut, insuring smooth work and great ease in operating.

"*The Eureka Nipper,*"

(now manufactured at our Trenton Works), which we are prepared to offer to the trade at greatly reduced prices. The following numbers and sizes are now in stock:

	4 in.	5 in.	6 in.
No. 10 Nippers, Bevel Edge	$6·00	$7·00	$8·00
No. 11 " Plain "	6·00	7·00	8·00
No. 30 Combination Plyer and Nipper	7·00	..	..
No. 20 Improved Wire Cutters	5·00	6·00	7·00
No. 41 Cast Steel Bell Hangers' Plyers	8·00	9·00	10·00

The Lalance & Grosjean Mfg. Co. have in press, and will issue in a few days, an appendix to their catalogue of August 15, 1875. Among the new goods is an increased assortment of Marbleized Ware, comprising Funnels and Measures; two new patterns of Pudding Dishes, oval and oblong; Tea Kettles, Coal Shovels, Basting Spoons and Dippers. In Tin Ware they have added a line of "Rinsing Pans" similar in shape and appearance to their regular Stamped Dish Pans, but made from lighter stock. They will be placed on the market at a very low price, and, it is expected, will fill a want long felt in the trade. The discount from their list of Fry Pans has been changed from 50 to discount 40 per cent. With this exception their discount sheet will be same as last. We print below their revised price list of some articles in Marbleized Ware, Kettle Ears, &c., which are advances on previous figures. This revised list went into effect on the 10th instant:

REVISED PRICES OF THE LALANCE & GROSJEAN MFG. CO., TO APPLY TO THEIR CATALOGUE OF AUGUST 15, 1875.

Marbleized Dish Pans.—Page 16.

No.	10	14	17	21	30
Per doz	$15·93	19·12	22·31	25·50	38·25

Marbleized Ex. Deep Oval Pans.—Page 34.

No.	85	100	120	140	160
Per doz	$5·75	6·37	8·50	10·63	12·75

Marbleized Stew Pans.—Page 13.

No.	16	18	20	22	24	26	28	30
Per doz	$5·00	5·50	6·37	7·44	8·50	9·56	12·75	14·50

Marbleized Fry Pans.—Page 33.

No.	0	1	2	3	4	5	6	7	8
Per doz	$5·00	5·73	6·37	7·00	8·28	9·56	10·83	11·00	12·00

Seamless Oblong Iron Pans.—Page 33.

Inches	13	14	15	16	18	20
Bright Iron, per doz	$8·50	9·50	11·00	12·00	14·75	18·25
Marbleized, "	12·00	14·00	15·00	16·00	20·00	25·00

Round Hammered Iron Pans.—Page 33.

Inches	6	7	8	9	10	11	12
Bright Iron, per doz	$2·30	3·00	3·75	4·50	5·50	7·00	8·25

Oval Hammered Iron Pans.—Page 33.

Inches	9	10	11	12	13
Bright Iron, per doz	$4·00	5·00	6·25	7·50	9·75
Inches	14	15	16	17	18
Bright Iron, per doz	$13·00	13·00	14·50	17·50	19·00

L. & G. Kettle Ears.—Page 32.

No.	1	2	3	4	5	6	7
Per gross pairs	$1·20	1·30	1·60	2·10	2·30	2·60	3·25

Extra Strong L. & G. Kettle Ears.

No.	100	200	300	400	500	600	700
Per gross pairs	$1·60	1·75	2·30	3·85	5·00	5·70	7·00

L. & G. Tea Kettle Ears.

No.	44	55	66	77
Per gross pairs	$2·45	2·75	4·75	5·85

Light Wash Basins.—Page 20.

No.	6	6½	7
Inch	10	10½	11½
Plain, per doz	$1·65	2·00	2·35
Retinned, per doz	2·30	2·80	3·10

Wash Bowls, 1x, No. C40.

Inch	
Plain, per doz	$3·50
Retinned, per doz	4·50

Cuspadores, Patent Eureka.—Page 38 (Extra Strong).

Per doz	$13·00

No.	100	150	200	250	260	270
	Blue.	Green.	Chocolate.	Red.	White.	Black.

Cuspadores, Patent Self-Righting Cast Bottoms.

Per doz	$9·00

No.	101	102	103	104
	Blue.	Chocolate.	Green.	Red.

Cuspadores, Common.

Per doz	$9·00

No.	0	1	2	3	5
	Light Blue.	Dark Red.	Lt. Red.	Dk. Blue.	Lavender.

Friedmann & Lauterjung have removed from their old stand on Warren street to the more spacious quarters at No. 91 Chambers street, where they have a room 25 by 150 feet, extending back to and including No. 73 Reade street. This gives them one of the most convenient locations and one of the finest Cutlery rooms in this city.

A. M. F. Watson retires as general agent for F. W. Moss, importer of Steel, Files, &c. He has connected himself with Morris, Tasker & Co., New York and Philadelphia.

In our last issue we published the circulars, &c., of Hotchkiss Sons and Wm. P. Kellogg & Co., in the matter of the renewal of the "Saladee" Patent for the manufacture of Curry Combs. Wm. P. Kellogg & Co. request us to publish the following letter on the same subject:

D. P. HOLLOWAY & Co.,
Solicitors of American and Foreign Patents.
Attorneys in Patent Cases.
514 Ninth, bet. E and F Streets,
WASHINGTON, Jan. 11, 1876.

Wm. P. Kellogg & Co.—GENTLEMEN: Yours received enclosing slip from *The Iron Age*. We know nothing as to the facts accompanying the reissue of the Saladee patent of our own knowledge. We can only say that if the principal examiner in charge of the class was the examiner referred to in Gilmore & Co.'s letter as having these two English patents before him, he acted the part of a surprised person remarkably well when we showed him patent No. 1638, of 1855, and we certainly supposed that he then saw it for the first time. Principal examiners must trust examinations to their subordinates, and they must do a great deal of work in a limited time. It continually occurs that they overlook cases; particularly cases patented abroad, which they have no time to hunt up; and especially is this likely to occur in a little class like this, that they scarcely have occasion to look at once a year. Be the cause as it may, we have in this case a patent allowed by one of the oldest and best of the examining corps, which is absolutely worthless. If Hotchkiss & Co. have the confidence they allege, let them sue you. They may bluster in the papers and in their circulars with impunity, but if they believe what they say, let them sue. We will enter your appearance and make answer without delay, and give them every facility for bringing the case to hearing. Let them back up their words by their acts. If we don't beat them in the courts we will pay all the recovery and all the costs and expenses you become liable for. We are willing "to stand by our opinion" as well as Gilmore & Co. Yours, truly,

D. P. HOLLOWAY & Co.

A good deal of American Hardware is in a very quiet and unostentatious way finding a market in other countries than our own. Manufacturers desirous of introducing their goods in the Australian market will find some interesting reading in the following letter:

AMERICAN HARDWARE AND ITS DESTINY.

To the Editor of the Iron Age:—Allow me to make a few remarks on the above subject. My observations in a 27 years' active experience in the general hardware trade may be of some advantage to the American manufacturer. Observing hardware dealers will agree with me in the relative position of American and foreign hardware in this market. Twenty-seven years ago a general hardware stock consisted of about two-thirds foreign and one-third American goods; at present you will find about one-tenth of the former in the same stocks. What has caused this great revolution in the trade? Allow me to give you my humble opinion. Hardware manufactures in all branches were at a low ebb up to the breaking out of our late civil war, and not until the government protected the young manufacturer by tariff did they take the new departure, the result of which we see to-day. This stimulant revived American genius, and with the inexhaustible resources of the country, the wealth of labor of the old world, which is constantly flowing into our country, American hardware manufacturers compete successfully with all nations of the world. Some differ on the tariff question, but nearly all out of selfish motives, and, therefore, I will not enter into any argument, but will deal only with facts. I admit that a vast number of American manufactures need no protection at present, are self-sustaining, and pushing their goods in all English colonies, and even into the mother country to much advantage. To prove my position, allow me to give you part of an article in the London *Ironmonger* of late date: "Many United States iron and hardware manufacturers are pushing their products in Australia and New Zealand to much advantage. The worst of it is that not a few of the American goods are declared, as to quality, to surpass our own; while a Melbourne agent of a firm of Birmingham merchants writes to his principals that American iron goods are far superior to English made, and latterly they have been much cheaper. When all sorts of American made goods now in this market are once seen and sold the buyer and user will never again look at English made articles of the same class." The American view on the subject, from the Pacific standpoint, you will find in a well defined article in *The Iron Age* of Nov. 25, 1875, on "A New Australian Mail Service, of which I will only make one extract: "Nearly all this trade consists in export of raw materials and the import of manufactured articles, and the United States has as many facilities as has Great Britain. Were it but turned thither the idle mills and furnaces of the Eastern States would be filled with busy, happy and contented workmen." Observing dealers in the trade will agree with the Melbourne agent in regard to quality, finish and style of American goods, and he kindly tells us that it is much cheaper. Having been a close observer of the business progress of the islands of Australia and New Zealand, I will dwell more particularly on the trade, etc., of those islands, which will answer for nearly every English colony. I will make it as concise as possible. Let me give you a geographical and statistic sketch of the islands.

Australia is divided into five colonies, with a population of 2,000,000. *Victoria Colony.*—Population, 800,000. Capital—Melbourne, with 200,000 population; Geelong, 25,000 population; Ballarat, 50,000 population; Portland, 7360 population. These are the principal towns of the colony. Products: Gold, silver, tin, wool, coal, wheat, oats, tallow, wine, preserved meats. *Trade Returns.*—Imports, $65,000,000, consisting of American and foreign manufactures. Exports, $71,649,820, of the above products. In this colony you have $93·33 per head, or $373·32 per family of four, export. *New South Wales.*—Population, 600,000. Principal towns—Sydney, population, 80,000; Youlburn, 4000 population. Products, the same as Victoria, with addition of iron, lead, platina, barley, oats, sugar, silk, hides. *Trade Returns.*—Imports, $39,218,100, of American and foreign manufactured goods. Exports, $39,482,365, of the above products. I have before me *The Australian*, from Sydney, Nov. 20th, 1875, with the report of the Registrar General, of which I will give you only the import and export for 1874, reduced into our currency. Imports, $56,468,695. Exports, $61,728,015; export, $65·66 per head, or $272·64 per head of family. Here you have an increase on import of $15,986,330, and $22,245,650 on exports. The statistics of the former cover the year of 1872. I am sorry I cannot give you the statistics of the rest of the colonies, as I have them not at hand, but this will give you an idea of the enormous growth of trade in those colonies. *South Australia.*—Population, 189,564. Principal town, Adelaide; population, 34,000. Products, the same as the former, with the addition of wine and bark. Imports, $10,815,520. Exports, $17,889,230; per head, $94·10, on $376·40 per family head. *Queensland.*—Population, 124,866. Principal towns—Brisbane, population, 20,000; Ipswich, population, 12,000. Products, the same as above, with the addition of cotton, tobacco, maize and arrowroot. Imports, $7,857,110. Exports, $13,065,700; export per head, $104·52, on $418·08 per family head. *Western Australia.*—Population, 30,000. Principal town, Perth; population, 4900. Products, the same as above, with the addition of oils, mahogany, sandalwood, and variety of other timbers, pearls, tortoise shell and whalebone. Imports, $10,738,000. Exports, $11,069,000. Please note this. Here you have the enormous exportation of $335·33 per head, on $1341·32 per family head.

New Zealand.—Population, 303,000. Principal towns—Auckland, population, 18,500; Dunedin, population, 24,000; Christchurch, population, 10,000; Wellington, Nelson, Napier, Grahamstown, Shortland, Lyttleton. Imports of the Island, $20,390,000; exports, 26 410,000. Products, very much the same as Australia. Imports, manufactured goods of America and foreign countries. Export per head, $87·16, on $348·64 per family head. The list of exemptions from duty in both islands is very large in the hardware line and its kindred branches, and the rest at a very low rate of duty. While I remain in this country I will be pleased to give such information to iron and hardware manufacturers and kindred branches as I have on hand. Here, gentlemen, you have a field which is inexhaustible, and if you only show a proper enterprise, there is no doubt about the future of this trade. If you do not, it will continue to languish on from year to year in the same unsatisfactory way, and the Old World will continue to reap the benefit, as of old. Much has been done by a few enterprising firms of New York, Boston and San Francisco, but no direct connection has been established as yet with the manufacturers of this country and the dealers in the islands. Now is the time to send *live* agents down for buying and selling goods, and as I am on the eve of going there in person, in the interest of several first-class manufacturers, I invite correspondence on the subject. Letters will reach me, after next Monday, in New York, in care of *The Iron Age*, up to the 22d of the month. Parties in the East wishing personal interview will please write in care of *The Iron Age*. One word more, and I will close. You are well aware that stocks are accumulating in all branches everywhere, notwithstanding the reduction of working time, and I fear this will be the case for a few years to come. There are only two ways open to you—either produce less, or seek new fields of operation. The latter, I think, will be preferable, and, in my humble opinion, Australia and New Zealand are the fields for you at present.

CARL STEPHAN, Dansville, N. Y.

BRITISH IRON MARKET.

(*Specially reported by cable for The Iron Age.*)

WEDNESDAY, Jan. 12, 1876.

Scotch Pig.—Just after our cable report for last week was dispatched, prices went up, and have since been steadily firm, the market being strong with a large business doing. The following are makers' quotations:

Gartsherrie No. 1	76/6
Coltness No. 1	80/6
Glengarnock No. 1	72/6
Eglinton No. 1	66/6

Manufactured Iron and **Rails** are without change to note.

IRON.

American Pig.—Business continues without change, transactions being few and small. The makers are by no means satisfied with present prices, and are talking of taking concerted action to advance them. On the other hand, buyers expect the market will go lower, and show no disposition to forestall their needs. Of course, at this season of the year, it is too soon to look for much business, but aside from the smallness of the business doing the market is dull and without animation. Prices remain as before. We note the sale of 500 tons No. 1 Foundry, Thomas, at $23. We quote: No. 1 Foundry, $23; No. 2 Foundry, $21; Gray Forge, $19 @ $20.

Scotch Pig.—The arrivals are sold about as fast as they come in, but aside from these sales transactions are confined to small retail lots. 200 tons Coltness, 100 tons Glengarnock and 250 tons Eglinton have been sold on private terms. We quote: Coltness, $32; Glengarnock, $31; Gartsherrie, $32·50; Eglinton, $29·50 @ $30.

Rails.—There is no change. We note the sale of 100 tons 45 lb. English Rails in this port at $45. We quote American Iron, $42 @ $46 at works.

Old Rails.—There is nothing to report, and we continue our quotation of $22·50, which is, however, nominal in the absence of recent sales.

Scrap.—The market is without change in the absence of sales. We continue our quotation of $30.

METALS.

Copper.—The week's sales have been restricted to 200,000 pounds Lake Superior, on the spot, at 23c. @ 23¼c. Nothing has transpired in futures. Baltimore is scarce and firm at 23¼c. The Calumet and Hecla mine of Lake Superior turned out upward of 13,000 tons ore during the season lately brought to a close. From London we possess no later telegrams, from which we conclude that the market there is unchanged. A week's later mail accounts are to hand, dated Dec. 25. We therefrom extract the following: "Bars show a reaction of about 10/ per ton from the values lately paid; but the quantity offered for sale is moderate, and chiefly confined to ordinary brands, special and picked marks being exceedingly scarce. There seems to be but little doubt that the Esk, direct for Havre, is really lost, and this may have some influence on quotations when all doubt on this subject is removed, her cargo consisting of 500 tons. Australian meets with more inquiry. Orders, however, are still limited at too low figures to permit of execution, except in rare instances. English remains quiet, but matters show no inclination to give way in price. The demand for manufactured is good for the time of the year, and prices remain firm." The manufactures of Copper are steady as follows: New Sheathing, 30c.; Bolts and Braziers, 31c.; Nails, 38c. @ 39c.; Bronze and Yellow Metal Sheathing, 21c.; Yellow Metal Bolts, 28c., and do. Nails, 21c., net cash.

Tin.—The arrivals of Straits Tin have been heavy at this port since the commencement of the year, summing up some 14,000 slabs. The shipments this way from the Straits have also been on a liberal scale, aggregating to New York and Boston, for December alone, 550 tons. There are now afloat for the same destination 16,000 piculs. It is to be hoped that consumption may be able to gradually absorb the ample supply in sight. Meanwhile, the market has been quite dull here at the following quotations in gold, for large lots: Straits, 19c. @ 19¼c.; English Refined, 19c. @ 19¼c.; ditto Common, 18¾c.; and Banca, 23¼c. London, per cable, quotes Straits £80, and Singapore stood $22·50 per picul, yesterday. Mail advices are also to hand from London up to the 25th ult., and read as follows: "Straits opened firm at the beginning of the week, and business has been done at £81. @ £81. 10/, cash, and throughout the week this quotation has been maintained, but without much doing. The shipments for the first half of the current month from the Straits are advised by cable as 330 tons, and it is still thought not improbable that the disturbances now going on in that quarter may later on have some influence on the supplies of Tin." Tin Plates are quiet, but firm. Not much business is expected this month, and the want of activity observable disappoints nobody. Hardly anything has been done. We quote large lots, ordinary brands, gold, per box, as follows: Charcoal Bright, $7·50 @ $7·75; do. Ternes, $7 @ $7·25; Coke Tin, $6 62½ @ $6·75, and Ternes, $6·25 @ $6·37½.

Lead.—There has been more doing in Common Domestic Lead, of which between 300 and 400 tons were taken at 5·90c., gold, and aside therefrom in small lots 70 tons at 5·90c. @ 5·95c., gold, which is the closing quotation. Of Spanish Lead 50 tons Spanish were taken at 6¾c., gold; but this sale is no criterion of the market, and we nominally quote Common Foreign, 7¼c., gold, as heretofore. Soft Missouri at St. Louis commands 7c., currency; the freight this way is 53c. The upward tendency in Europe has remained unchecked, owing to the brisk demand for and scarcity of Spanish, supplies in the Peninsula being, from all appearances, withheld. No change is to be noted in the manufactures of Lead, which we quote as follows: Bar, 8¾c.; Pipe, 9c.; and Sheet, 9¼c., less 10 per cent. to the trade.

Spelter and Zinc.—The combination people at their last meeting, a week ago, raised Domestic Spelter to 7·60c., currency, less the discount, at which figure it is not active. In Foreign little transpires; we note a sale of 5 tons C. G. H. at 7·30c., gold. We quote Silesian

7·27½c. @ 7·40c., gold. No later accounts are to hand by mail from Germany. The firmness in the English market continues; the metal is scarce and enjoys a good steady demand. *Sheet Zinc.*—Nothing of special interest has transpired therein, and we quote the same, nominally, 9c., gold.

Antimony.—A moderate amount of activity is noticeable at 14½c., gold, for Foreign. The London quotation remains £59.

IMPORTATIONS.

Of Hardware, Iron, Steel and Metals into the Port of New York, for the week ending Jan. 11, 1876:

Hardware.

Brown Bros. & Co.
Iron rods, coils, 695
Bryce Wm. & Co.
Cases, 1
Barstow E. W. & Co.
Chains, lengths, 8
Chains, cks., 2
Chains, 6
Baeder, Adamson & Co.
Wire netting, rolls, 30
Boker Hermann & Co.
Mdse. pkgs., 20
Curley J. & Bros.
Mdse. pkgs., 1
Dreyfus Bros. & Weiller,
Cases, 3
Dale John G.
Casks, 1
Degraw, Aymer & Co.
Chains, cks., 13
Lengths, 1
Casks, 1
Friedmann & Lauterjung,
Mdse. pkgs., 2
Fuller Bros.
Chains, cks., 35
Casks, 2
Cases, 1
Field A. & Co.
Chains, cks., 76
Packages, 10
Mdse. pkgs., 12
Cases, 6
Casks, 3
Frasse P. A. & Co.
Mdse. pkgs., 1
Guental Geo.
Screws, cs., 21
Casks, 2
Hodgkins & Haigh,
Casks, 2
Hildick A. H.
Nails, kegs, 50
Packages, 3
Lau & Garthchs,
Mdse. pkgs., 5
Lennox E. S. & Co.
Wire bale ties, lots, 960
Galv. wire, lots, 53
Laughland & Co
Netting, cs., 4
Wire, pkgs., 11
Mason John W. & Co.
Wire rope, coils, 1
Moore Henry,
Files, cks., 3
Moore's J. P. Sons,
Wadding, cs., 3
Owen A. & Co.
Gun wads, cs., 3
Quackenbush, Townsend & Co.
Casks, 2
Rosenfeld Bros.
Cases, 3
Sohniz & Ruckgaber,
Iron ware, cs., 54
Squires H. C.
Guns, cs., 1
Schoverling & Daly,
Mdse. pkgs., 8
Tillotson L. G. & Co.
Cases, 1
Van Wart & McCoy,
Mdse. pkgs., 8
Walter & Sanders,
Cases, 8
Order.
Files, cks., 4
Packages, 8

Iron.

Bonniger Bros.
Spiegel, tons, 300
Brown J. B.
Scrap, cks., 18
Loose, lots, 1
Henderson Bros.
Pig, tons, 300
Mdse. pkgs., 17
Laughland & Co.
Hoybands, bdls., 350
Lang W. Bailey & Co.
Bars, 166
Bundles, 10
Mitander Nils,
Bars, 1644
Marvel Wm. D.
Ore, lots, 1
Naylor & Co.
Bars, 9519
Phelps, Dodge & Co.
Sheet, bdls., 133
Sampson S. S.
Pig, tons, 100
Order,
kilos, 363,500
Bars, 3681
Pig, tons, 400
Ore, tons, 150

Steel.

Booth E. E. & Co.
Bundles, 100
Brown Wm.
Cases, 10
Bundles, 187
Dale John G.
Bundles, 150
Findlay Wm.
Bundles, 340
Frith Edward,
Cases, 14
Haigh J. Lloyd,
Bundles, 133
Lang W. Bailey & Co.
Bundles, 93
Cases, 1
Merchants Dispatch Co.
Bundles, 10
Bars, 32
Naylor & Co.
Cast, tires, 31
Cases, 16
Bars, 12
Scrap, spring, tons, 50
Moore Henry,
Cases, 5
Piersons & Co.
Bessemer, bdls., 295
Prosser Thos. & Sons,
Mdse. pkgs., 31
Sulzbacher & Heyman,
Bars, 130
Cases, 9
Saxton & Co.
Cases, 5
Woodford W. O.
Bundles, 73
Cases, 64
White S. C.
Bundles, 144
Order.
Wire, bdls., 173
Bundles, 1094
Cases, 3
Bars, 4
Rods, 197
Casks, 4

Metals.

Brown J. B.
Scrap, brass, bbls., 13
Scrap, copper, bbls., 2
Brown Bros. & Co.
Tin, slabs, 1123
Becker H. & Co.
Copper, bags, 160
Baring Bros. & Co.
Tin, slabs, 1004
Byrne Joseph & Co.
Tin plates, bxs., 563
Bruce & Cook,
Tin plates, bxs., 1883
Cort N. L. & Co.
Tin plates, bxs., 897
Dickerson, Van Dusen & Co.
Tin plates, bxs, 3248
Terne plates, bxs., 100
Drexel, Morgan & Co.
Tin, slabs, 737
Grund F. & Cerero,
Lead, pigs, 750
Kidder, Peabody & Co.
Tin, slabs, 552
McColl Duncan,
Scrap, cks., 5
Phelps, Dodge & Co.
Tin plates, bxs., 8797
Black taggers, 100
Tin, ingots, 600
Tin, bxs., 3165
Tin, slabs, 300
Scheider Jos. & Co.
Tin plates, bxs., 525
Vatable H. A. & Son,
Scrap zinc, cks., 5
Windmuller L. & Roelker
Zinc sheets, cs., 40
Order.
Tin plates, bxs., 831
Terne plates, bxs., 550; cs., 49
Tin and black taggers, bxs., 220
Tin, ingots, 300
Tin, bxs., 274
Tin, slabs, 6377
Without Bills of Lading.
Tin, ingots, 392

OLD METALS, PAPER STOCK, &c.

The Old Metal market still continues quiet, as there is little demand from consumers for any description of stocks. Machinery Iron and Stove Plate have somewhat declined in price, and are selling at $14 per ton. Rags and Paper stock are in good demand, and prices are firm at our quotations. We quote the following as the current purchasing rates:

Old Metals.—Copper, 16c. @ 17c. per lb.; Yellow Metal, 11c.; Brass, 10c. @ 12c.; Composition, heavy, 13c. @ 14c.; Lead, solid, 5½c.; Tea Lead, 5c.; Zinc, 4¼c. @ 4½c.; Pewter, No, 1, 18c.; do., No. 2, 8c. @ 12c.; Spelter, 5½c., Wrought Iron, $27 per ton; Light do., $14 per ton; Stove Plate, $12 per ton; Machinery, do., $14 per ton.

Rags, &c.—Canvas, Linen, 4¾c. @ 5¼c.; do. Cotton, No 1, 5¾c. @ 6¼c.; No. 2, 2¾c.; White, No. 1, 5¾c.; No. 2, 4c.; Colored, do., 2c. @ 2½c.; Mixed, Woolen, 2c. @ 3c.; Soft, do., 5c. @ 5½c.; Gunny Bagging, 1¾c.; Jute Butts, 1¾c. @ 2c.; Kentucky Bagging, 3c.; Book Stock, 3c.; Waste Paper and Scraps, 1¾c.; Kentucky Bale Rope, 4c.; Oakum Junk, No 1, 4¼ @ 5c.; do. No. 2, 3c.; Tarred Shaking, 1c. @ 1¼c.; Grass Rope, 2¾c. @ 3c.

COAL.

The Coal market still continues very quiet, and dealers expect no change in the condition of affairs until the opening of the spring trade. The programme of the Coal combination for this year has not yet been adjusted.

The quantity of Coal sent from the Schuylkill region for the week ending Jan. 1 was 10,828 tons, against 41,035 tons for the corresponding period of last year. Decrease, 30,207 tons. The total for the year, commencing December 1, is 275,842 tons, against 381,906 tons for the corresponding period of last year. Decrease, 106,064 tons.

The quantity sent from all the regions of which we have any report is, for the week, 90,601 tons Anthracite, against 118,625 tons for the corresponding period of last year; decrease, 28,024.

The total amount of Anthracite sent for the year is 20,476,829 tons, against 20,297,017 for same period last year; increase, 179,812 tons. The quantity of Bituminous is 3,903,352 tons, against 3,495,719 tons for corresponding period of last year. Increase, 407,633 tons.

The following are the cargo prices of Provincial Coals, delivered in New York:

Pictou	$5·50
Block House, at mines $2, gold	5·00
Caledonia, at mines $1·75, gold	4·75
Little Glace Bay, at mines $1·75, gold	4·75
Sydney—Old Mine	5·50
" Reserve Mine, at mines $1·75, gold	4·75
" International	5·50

Duty, 75 cents per ton, gold, on the coarse, and 40 cents on the slack.

We quote as follows: Anthracite, $4·95 to $6·10; Cumberland, $6·25 @ $6·75; West Virginia, $6·75; James River Steam, $6·25; James River Carbonite, $9 @ $9·50; Kanawha House, $11·50; American Gas, $6·75 @ $7·25; American Cannel, $12 @ $14; Pennsylvania and Westmoreland, $6·75; Newburgh Orrel, $6·50; Sterling Ohio, $10; Ince Hall, $17 @ $18; Liverpool House Cannel, $17; Liverpool Gas, $12; Newcastle Gas, $7; Scotch, $6·50 @ $7.

PHILADELPHIA.

Office of *The Iron Age*, 230 South Fourth st., PHILADELPHIA, Jan. 11, 1876.

PIG IRON.—The dulness noted in our last still prevails, and no sales of any importance have been effected. Small lots of Allentown, Crane, Chickies and other known brands have been sold at $24, but the tone of the market is weak, and it would be impossible to place large lines unless at a material reduction. We quote, as fairly representing the market: No. 1 Pig, $23 to $24; No. 2, $21 to $22; Gray Forge, $18 to $22. The sale of Glendon at $22 quoted in our last, should have been at $22, at furnace—not delivered here.

BARS are somewhat more active, and we quote 2·5c.

RAILS—Are quiet; no sales are reported since our last. Quotations are, $65 to $67, at the mills for Steel Rails, and $42 to $46 for Iron Rails.

OLD RAILS.—There is more business doing, and several sales have been made at $25 delivered here, at which price the market is steady. Sales of Street Rails are also reported at $27·50.

SCRAP.—There is no improvement to note, and we hear of no sales. Wrought Scrap is nominally $28 to $28·50; Cast is offered at $18 without attracting buyers.

PITTSBURGH.

PITTSBURGH, Jan. 11, 1876.

The Iron trade, so far as Pittsburgh is concerned, has undergone but little change during the past week; business is dull, as it nearly always is at this particular time, but the outlook is more encouraging, and there is a better feeling in consequence. There is an increasing inquiry for Pig Iron, and the volume of business within the past week was considerably larger than it has been for some time. Included in the reported sales were several lots ranging from 100 up to 500 tons, and while prices are no better, a stronger feeling on the part of sellers is being developed. It appears to be pretty generally conceded that hard pan has been reached; this is strengthened by the reduction in stock, light production and almost certainty of an increased consumption, hence, producers generally are indifferent about selling good Mill Iron at quoted rates. This has not been without its effect in stimulating the demand, as buyers, apprehensive that there might possibly be an advance, are on the alert, some of them disposed to anticipate future wants. In regard to Manufactured Iron, there is nothing particularly new to record. Business is dull just now, as it always is, but our manufacturers are hopeful of at least an average spring trade; and what we have said in regard to Finished Irons is equally applicable to Nails. Stocks are light. An increased consumption this year is almost certain as compared with 1875, and it appears to be generally conceded that prices have touched bottom. The Steel mills generally have done a very fair business during the past year, and there is no reason apparent why they should not do as well, if not better, in 1876. About the only source of complaint is in regard to prices, which, under the influence of an active competition, have been cut so close that there is but little margin for profit.

QUOTATIONS.

PIG IRON.—No. 1 Foundry, $25 to $26, 4 mos.; No. 2, $23 to $24; Gray Forge, $21·50 to $22, 4 mos.; Charcoal Mill, $22 to $23; do. Foundry, $27 to $30.

BAR IRON.—2·15 to 2·25, 60 days.

NAILS.—$2·75, 60 days, with 2 per cent. off for cash.

HORSE SHOES.—4¼c. per lb., cash, for round lots, and 5¼c. to 5½c. in a jobbing way.

STEEL RAILS.—$65 to $67, cash, delivered free on cars in Pittsburgh.

The Pittsburgh *Commercial*, of Jan. 8, says: As intimated in our report last week, there has been some improvement in the demand for Pig Iron since January 1, and the sales reported below show a considerable increase in the amount sold, but not any change in price, and it is not expected that there will be much variation from present rates for some time to come. We are reported the following sales:

BITUMINOUS COAL SMELTED FROM LAKE SUPERIOR ORE.

500 tons gray forge	$22·00—4 mos.
300 tons gray forge	Private terms.
200 tons gray forge	22·00—4 mos.
100 tons gray forge	22·00—4 mos.
100 tons gray forge	22·25—4 mos.
50 tons gray forge	22·00—4 mos.

ANTHRACITE.

100 tons gray forge	$22·00—4 mos.
100 tons gray forge	21·00—4 mos.
20 tons No. 1 foundry	25·00—4 mos.
20 tons No. 1 foundry	26·00—4 mos.

CONNELLSVILLE COKE.

500 tons gray forge	Private terms.
50 tons gray forge	$21·00—cash
20 tons No. 2 foundry	23·00—cash

BILLETS.

20 tons steel billets	$60·00—6 mos.

BOSTON.

JAN. 8.—*Pig* is still listless and easy, the impression somehow being about that there is another miscellaneous lot to come out of the "money changers' hands;" and buyers are holding back waiting the developments of the loaning institutions. There is an unusual amount of variety in the quotations named this week, the No. 1s of various brands ranging through a difference of $4 a ton, about twice the disparity that has heretofore been quoted. Boston seems determined to maintain its reputation as the cheapest point for Iron buyers in the country, that is, if reports from other cities represent actual business. We quote a range of $19 to $26 for the varied grades, the extremes representing something exceptional. *Bar* iron is moving steadily along at $51·50 for jobbing lots of refined, while common iron is talked about down toward $48, with, however, no business reported. Reports from the producing points are not as yet favorable for replenishing our diminishing stocks, and yet few have any confidence that an advance on the present range could now be established. *Steel* is still very quiet, and prices are unchanged. We quote: American Tool, 14c. to 15c.; American Machinery, 9c. to 9½c.; Bessemer Tires, 6¾c. to 7¼c.; Sweet's Excelsior Tire, 8½c. to 12c.; English Tool, 16c. to 18c., gold. *Copper* still remains in a stupid and steady position, quoting 23¾c. to 23½c. for spot or futures, according to the wants of buyers. For manufacturers we quote New Sheathing, 30c.; Bolts and Braziers, 31c.; Yellow Metal Bolts, 20c. to 29c. *Lead* is quiet and steady. Stocks are still very light, both here and to arrive. We quote Pig 6c. for Domestic, and 6¾c. to 6½c. for Foreign; Sheet and Pipe Lead, 9c., currency; Tin Lined Pipe, 16½c.; Bar Lead, 9c., less usual trade or 10 per cent. discount. *Antimony* is firm, with a small inquiry at 13½c. *Spelter* is strong and quiet at $7·45, 30 days, and $7·35, prompt cash, all currency. Silesian is dull at $7·75. *Tin* is a trifle easier with no business to either Pig or Plates. We quote: Straits, 19½c.; Banca, 24c.; Refined English, 19½c., gold. Plates are active; we quote Charcoal I. C., $7·50; Coke, $6·75 to $7; and Terne at $6·30 to $6·75, gold.—*Com. Bulletin.*

CINCINNATI.

Messrs. L. R. HULL & CO., under date of Jan. 10, write us as follows: PIG IRON.—The general tone of the market is better than at last writing, although we cannot report any advance in prices. While the stocks of Hanging Rock Charcoal Iron are sufficient for present needs, they are much smaller than at this time a year ago, and holders are not disposed to sell largely at market prices. The demand for Foundry grades is good for the times, and sellers refuse to make concessions to increase sales:

HOT BLAST CHARCOAL.

Hanging Rock No. 1	$25·00 @	—4 mos.
" " No. 2	23·00 @	—4 mos.
" " Forge	21·00 @ 22·00	—4 mos.
Southern Brands No. 1	23·00 @ 24·00	—4 mos.
" Forge	21·00 @	—4 mos.
Virgin'a No. 1	24·00 @ 25·00	—4 mos.
" No. 2	22·50 @ 23·00	—4 mos.
" Forge	21·00 @ 22·00	—4 mos.

HOT BLAST STONE COAL AND COKE.

Hanging Rock No. 1	$23·00 @	—4 mos.
" " Forge	21·00 @	—4 mos.
Red Short No. 1	27·00 @	—4 mos.
" Forge	24·00 @	—4 mos.
Am. Scotch, No. 1	24·00 @ 25 00	—4 mos.

COLD BLAST CHARCOAL.

Hanging Rock Car Wheel	$40·00 @ 50·00	—4 mos.
Missouri " "	35·00 @ 40·00	—4 mos.
Southern Br'ds " "	30·00 @ 40·00	—4 mos.
Machinery and Forge	30·00 @ 35·00	—4 mos.
Blooms	@	—4 mos.

LOUISVILLE.

Messrs. GEO. H. HULL & CO., under date of Jan. 10, writes us as follows: The market is dull, but without change in prices. The usual time, four months, is allowed on the quotations below:

HOT BLAST CHARCOAL.

No. 1 F'dry, from Hanging Rock Ores	$25·00 @ 26·00
" 2 " " " "	23·00 @ 24·00
" 1 Mill, " " " "	—@—
" 1 F'dry, from Alabama, Georgia and Tennessee Ores	23·00 @ 24·00
" 2 F'dry, from Alabama, Georgia and Tennessee Ores	21·00 @ 23·00
" 1 Mill, from Alabama, Georgia and Tennessee Ores	21·00 @ 22·00

HOT BLAST STONE COAL AND COKE.

No. 1 F'dry, from Hanging Rock Ores	$23·00 @ 24·00
" 2 " " " "	22·00 @ 23·00
" 1 Mill, " " " "	21·00 @ 22·00
" 1 F'dry, from Alabama, Georgia and Tennessee Ores	23·00 @ 24·00
" 2 F'dry, from Alabama, Georgia and Tennessee Ores	22·00 @ 23·00
" 1 Mill, from Alabama, Georgia and Tennessee Ores	21·00 @ 22·00
No. 1 F dry, from Missouri Ores	24·00 @ 25·00
" 2 " " "	24·00 @ 25·00
" 1 Mill, " "	25·00 @ 26·00

COLD BLAST CHARCOAL.

Car Wheel from Hanging Rock Ores	35·00 @ 40·00
" " Tennessee Ores	28·00 @ 30·00
" " Alabama and Georgia Ores	28·00 @ 38·00
Car Wheel from Kentucky Ores	28·00 @ 40·00

ST. LOUIS.

Messrs. SPOONER & COLLINS, Iron commission agents, 409 North Third street, St. Louis, under date of Jan. 6, report the Iron market as follows: We have nothing new to report regarding the condition of our market. There is considerable inquiry for iron to be delivered during the season, but at extremely low prices. We still hope for an advance and for better times. We quote on 4 months time:

Mo. Stone Coal, No. 1 F'dry.	$26·50 @ 27·00	—4 mos.
" " No. 2 F'dry.	24·00 @ 25·00	—4 mos.
" " Gray Mill	23·50 @ 24·00	—4 mos.
" Charcoal, No. 1 F'dry	26·00 @ 27·00	—4 mos.
" " No. 2 F'dry	23·50 @ 24·00	—4 mos.
" " Gray Mill	23·00 @ 24·00	—4 mos.
Tenn. Charcoal No. 1 F'dry	25·00 @ 26·00	—4 mos.
" " No. 2 F'dry	23·00 @ 24·00	—4 mos.
" " Gray Mill	22·00 @ 23·00	—4 mos.
" Coke Iron No. 1 F'dry	25·00 @ 26·00	—4 mos.
" " No. 2 F'dry	23·00 @ 24·00	—4 mos.
" " Gray Mill	23·00 @ 24·00	—4 mos.
H. R. Charcoal No. 1 F'dry	26·00 @ 27·00	—4 mos.
H. R. " No. 2 F'dry	24·00 @ 25·00	—4 mos.
H. R. " Gray Mill	24·00 @ 25·00	—4 mos.
Massillon Iron, A, No. 1	34·00 @ 35·00	—4 mos.
" " B, No. 1	32·00 @ 33·00	—4 mos.
" " No. 2	30·00 @ 31·00	—4 mos.
Cold Blast Car Wheel, Mo.	32·00 @ 35·00	—4 mos.
" " Tenn.	30·00 @ 32·00	—4 mos.
" " Ala.	30·00 @ 31·00	—4 mos.
" " Hanging Rock	35·00 @ 40·00	—4 mos.
Mo. Charcoal Blooms	60·00 @ 65·00	—4 mos.
" Scrap "	60·00 @ 65·00	—4 mos.
Mo. Charcoal Hammered Billets	80·00 @ 90·00	—4 mos.
Assorted Bar Iron	2 4-10 rate.	
No. 1 Wrought Scrap	1c.	per lb.
Heavy Cast "	¾c.	"
Light Cast "	½c.	"

BALTIMORE.

Messrs. WYETH & BROTHER, Iron and Steel merchants, South Charles and Lombard streets, report us the following prices under date of Jan. 11: We note an improvement in business during the past week, the demand being steady and quotation figures ruling firm:

AMERICAN REFINED BAR IRON.

1 to 6 wide by ⅜ to 1 thick.. } 1 to 4½ wide by 1⅜ to 2 thick }	2 5-10 to 2 6-10c. ₱ lb.
Round and square, ordinary sizes, from ⅜ to 2 inclusive	2 5-10 to 2 6-10c. "
Hoop Iron, 1½ wide and upward	3½ to 4c. "
Band Iron, from 1½ to 4 in. wide	3 to 3½c. "
Horse Shoe Iron ⅜ to 1 wide by ⅜ to ½ thick	3½ to 4c. "
Norway Nail Rods	7 to 7¼c. "
Black Diamond Cast Steel, Flats, Squares and Octagon, ordinary sizes	15½ to 16c. "
Machinery Steel	11 to 11½c. "
Cast Spring Steel	10 to 10½c. "
Homogeneous Steel Plate	10½c. "
Perkins' Horse Shoes, per keg of 100 lbs.	$5·12½
" Mule Shoes "	6·12½

Common Horse Nails, from 14c. to 18c. per pound.

	10	9	8	7	6	
Putnam Horse Nails	23	24	25	26	28c.	per lb.
	10	9	8	7	6	
Globe Horse Nails	23	24	25	26	28c.	per lb.

R. R. Spikes.....5¼ by 9-16 at 2 9-10c to 3c. per lb.

Messrs. R. C. HOFFMAN & Co., Iron and commission merchants, Nos. 23 and 25 South Frederick street, report the Pig Iron market as follows, under date of Jan. 11: We have no change to note in the Iron market since our last report. Sales have been small at about quotations:

Baltimore Charcoal	$32·00 @ 35·00
Virginia "	28·00 @ 34·00
Anthracite No. 1	24·00 @ 25·00
" No. 2	23·00 @ 24·00
" No. 3	21·00 @ 22·00
White and Mottled	16·00 @ 18·00

RICHMOND.

Mr. ASA SNYDER, Iron Merchant and Furnace Agent, Richmond, Va., writes as follows under date of Jan. 10: The receipts of Charcoal Iron continue very light. There is considerable inquiry, and prompt sales at quotations of desirable brands. In addition to the receipts of the past 60 days, more than 1000 tons have been sold from warehouse in that time, thus reducing the stock in hand very considerably.

Virginia cold blast Charcoal Pig Irons	$27·00 @ 33·00
" hot " "	24·00 @ 28·00
Va. hot blast Coke Pig Iron, No. 1 ex.	24·00 @ 25·00
" " " " No. 2 ex.	22·00 @ 23·00
" " " " No. 3 ex.	21·00 @ 22·00
Virginia Anthracite. No. 1 ex	25·00 @ 26·00
" " No. 2 ex	23·00 @ 24·00

FOREIGN.

FRANCE.

(*Moniteur des Interets Materiels*).

PARIS, Dec. 26, 1875.—*Metals.*—The last weeks of a year drawing to a close are generally dull ones in the European metal markets, but this year they are even more so than is usually the case. Although submitting to sacrifices, a great many establishments both in England and on the Continent have gone on producing to their full extent, while a comparatively few have resolutely curtailed their output in time, and it is now becoming evident that the latter have pursued the wiser policy. Works with a large capital have, as a general thing, continued to produce in full, and this constitutes one of the notable facts of the present industrial crisis. The equilibrium between the demand and the supply has been disturbed, and England, the industrially most powerful nation, is the proportionately greatest sufferer thereby. *Copper.*—There is little transacting in the metal at this center, and no great changes have taken place. We quote, deliverable at Havre: Chili Bars, 213 francs; Common ditto, 210; Ingots, 220; English Tough Cake, 217·50; and pure Corocoro Ore, 210. At Havre the following are the quotations: Old Yellow Metal, 140 to 145 francs; old Copper, 205 to 210; Yellow Metal, 160 to 200; Chili Bars, 212·50 to 215; and Ingots, 220 to 222·50. The Marseilles market remains firm; Red Tokat at 210; Round, 250; Sheets, 240; and Yellow Metal Sheathing, 225; all less 3 per cent. *Tin.*—The various markets during the week have shown but little animation. An upward movement was looked forward to, but whatever improvement there was has been of short duration, and we have thus been carried back to the opening figure. The deliveries do not come up to expectation, and the stock, already large, will be increased next month by the holding of another Dutch sale of something like 25,000 slabs. We have been quiet here; Banca, deliverable at either Havre or Paris, may be quoted 225 francs; Straits, 217·50; and English, deliverable at Havre or Rouen, 215. At Marseilles there is little doing, on the basis of 215 francs for Straits and Billiton. *Lead.*—The market for this metal maintains a solid position, and great firmness prevails. We are remarkably still here with the different sorts indiscriminately, and quote as follows: French, 56·50 francs; Spanish, 56; English, 56, and Belgian and German, 57. At Havre, Spanish commands 56, while the other kinds are bringing 56·50. Accounts from London remaining invariably firm, rates are fully sustained at Marseilles on the basis of 52 to 52·50 francs for soft. *Spelter* has been fully sustained without developing much activity in France. The Continent is comparatively lower in prices than England. We have been steady here, and quote Silesian, deliverable at Havre, 67 francs; other good brands at either Havre or Paris, 66·50. At Havre, Silesian is bringing 64·50 to 65. No change is reported from Marseilles. All the foregoing French metal quotations are for 100 kilos. *Iron.*—The news we have to put on record for the current week is important, but not favorable. The Creusot Works have obtained an order for 3000 tons Steel Rails in Belgium, but at the low figure of 245 francs, free on board at Dinant. It must be confessed that at so low a figure the victory is dearly bought, and does more injury than good to general metallurgical interests. At the same time the Department of the Navy accepts the offer of the Tarn and Garonne Co. of 38,000 kilos rivets at the low figure of 39·50 francs; at first the same company insisted on 43·70 francs. There is no reason to rejoice at increased activity obtained at a sacrifice of this nature. *Coal* has recovered its firmness, but we do not expect much activity this winter, and have little faith in the maintenance of present prices. Coal for household purposes is firm enough here, but the quiet in industrial circles prevents much of an improvement. We believe in the future of Coal mining in France, but the present industrial stagnation will have to be overcome ere these promising interests can be developed to their full extent.

BELGIUM.

(*Revue Universelle*).

BRUSSELS, Dec. 26, 1875.—*Iron.*—There is but one thing we are able to suggest in order to mend matters in the Iron situation in Belgium, and that is a general reduction of production, but competition among producers is such that it is unlikely some common course of action can be arrived at. This being the case the removal of the duty on iron and its manufactures in Germany, to date from January 1, 1877, is all the more important, and Belgian Iron industry will in due time reap its share of benefit from this extended field of activity; but as a year will have to pass by ere this importation into Germany duty free will go into effect, we shall have to rely on our own good management alone in the interval. We are requested from Holland to quote the various kinds of Iron more regularly in our reviews, but have to state in reply that prices are so irregular in Belgium at the present moment that we have to abstain from doing so. The only test at present is to make firm offers. Mr. F. Nyst, of Liege, has obtained the contract for Iron work for the Swiss telegraphs, thus beating all other Belgian as well as the German competitors. The Stenoy Works, in the department of the Meuse, will be reorganized under the formation of a new concern, in which several manufacturers of Liege will be associated. The establishment will be remodelled according to the latest inventions, and a rolling mill for thin sheet Iron will be added. *Coal*—Remains in a favorable position pretty much everywhere in Belgium. Not much change can be reported since our last review; activity in the various districts is kept up, and at some of the mines a slight accumulation of stock is observable, due to insufficient railroad accommodation to bring the coal to market.

GERMANY.

(*Borsenhalle*).

HAMBURG, Dec. 26, 1875.—*Metals.*—The German markets generally have been quite dull during the week, without important changes in value. At Berlin little animation has prevailed; good qualities of English and Australian *Copper* have ranged between 89 and 93 marks the 50 kilos. At Stettin prices have ranged according to quality and the size of lots sold between 95 and 100 marks. Here a certain weakness has manifested itself, and a lot of Best Selected English has gone at 89 marks. We quote Minnesota 910. *Tin* has again given rise to much disappointment in the German markets, which have remained quiescent throughout. At Berlin Banca is quoted 92 to 92·50, while English does not command over 89 to 89·50 the 50 kilos. Nothing has been done from first hands here. We quote Banca 93, and English 96 marks. Transactions in *Lead* have been confined to moderate lots, owing to the reduced available supply in the leading German markets. At Berlin, Hartz, Taronwitz and Saxonian are bringing 23·25 to 24 marks the 50 kilos. The quotation for Spanish, at Stettin, is 27 marks, while German is selling at 25. We have been firm here, with moderate dealings, and quote as follows: German, 23·50 to 24 marks; English Soft Pig, 24·50 to 25; and English Sheet, 25 to 25·10. *Spelter.*—The Vielle Montagne Co. has discovered a remarkably rich mine of calamine, at Welkenraed, if the reports received to that effect prove correct. Not much has been doing in the German markets in Spelter on the spot, while futures have been active. At Berlin good qualities Silesian demand from 25 to 26 marks the 50 kilos, while at Stettin 27 marks is readily paid. At Breslau the metal is firm at 24 marks, on the spot, while here none but nominal quotations for available Spelter could be given, there being none procurable.

HOLLAND.

(*Koch & Vlierboom*).

ROTTERDAM, Dec. 21, 1875.—*Tin* remains in a dull sort of mood, with some isolated afloat sales of Billiton at 49 guilders, and, on the spot, at 47¾.

CHINA.

(*Arnhold, Karberg & Co.*)

CANTON, NOV. 24, 1875.—*Metals.*—Stocks of *Lead* are getting into small compass, and buyers are willing to operate for arrival at $7·40 to $7·45 per picul for L. B. Sales on the spot have been effected at $7·55 per picul. *Tin.*—The disturbances at Perak, which may possibly have the effect of curtailing supplies, caused buyers to come forward more freely, and a fair amount of business has been done at gradually hardening rates, culminating in a rise of about 50c. per picul. The market closes strong, with an upward tendency. *Quicksilver.*—The market has been weakened somewhat by re-sales by native speculators at $98 per picul. For forward delivery $96·50 would to-day be obtainable, but the demand is trifling, dealers, in view of the probable restriction of production of Vermillion at the approach of the Chinese New Year, showing but little disposition to operate to any great extent. *Yellow Metal* is improving. We quote: Lead, $7·40 to $7·65; Tin, $22 to $24·50; Quicksilver, $96 to $98; and Yellow Metal, $23 to $24. *Exchange* on New York, 5 per cent. discount for 5 months' sight.

EAST INDIES.

(*Aitken, Spence & Co.*)

COLOMBO, Ceylon, Nov. 30, 1875.—*Plumbago.*—Our quotations are well maintained; dealers are more pretensious, with firmer advices from London. Chips and Dust are in special request, and are so scarce that dealers decline to contract ahead, preferring to sell in small lots as they are able to produce them. The shipments to the United States since Oct. 1 have reached, to date, 14,829 cwts., against none during the corresponding period last year. There have been shipped to the United Kingdom, 8910; to Marseilles, 111; to Trieste, 364, and to Australia, 137 cwts. We quote Lump, free on board, without freight, exchange at par, cleaned, including packages per ton and duty, 310/; Chip, 170/; and Dust, 120/, with a moderate business doing at the close. *Shipping.*—The Union sailed on the 25th instant, and will shortly be followed by the Buston Vale. Another hardy sized vessel is required to follow. *Exchange.*—We quote for this mail, six months' credits, 1/10¾, and documents, 1/10¾. Bank selling rates, 1/10¼. Private credit rate, 1/10¾ to 1/10 5-16.

(*Dummler & Co.*)

BATAVIA, NOV. 20, 1875.—*Tin.*—The next auction of about 10,000 piculs Billiton is advertised for Monday, Dec. 13. *Coal.*—We note sales of English at 21 guilders, deliverable at Batavia, and at 25 on the Coast, as well as Australian at 15·50 on credit. *Freights.*—No settlements have been made during the week for the Atlantic States. *Exchange.*—Rates have continued to rule in buyers' favor, owing to the reasons alluded to in our last review, as well as to the loss of our inward mail steamer the W. K. der Nederlanden, with some 300,000 guilders specie on board. In London the banks were sellers at 11·67½, while credits found buyers at 11·62½, and documents at 11·60. Closing private rate on London 11·60 to 11·65; bank, 11 67½; all 6 months' sight.

(*Schmidt, Kuetermann & Co*).

PENANG, Nov. 24, 1875.—*Tin.*—The market opened pretty firm at $22·90 to $22·87½ per picul for unsmelted, but lower quotations reported from London caused, subsequently, the metal to decline to $22·80 to $22, but when news of the disturbances at Perak came to hand, a lively demand sprang up again, and rates rapidly advanced from $22·10 to $23·20. The interruption in telegraphic communication with Europe subsequently checked this rise, and purchases were made since at $22·40 to $22·50. Stocks are now reduced to 1500 piculs.

Our English Letter.

Review of the British Iron, Steel, Metal and Hardware Trades.

(*From our Regular Correspondent.*)

SHEFFIELD, ENG., Dec. 27, 1875.

THE HOLIDAYS

are now being strictly kept, as becomes us—a people accustomed to the uproarious observance of Christmas tide and all the many enjoyable rites of Yule-tide. We are this year keeping Christmas in weather which would be much more appropriate to the month of April than to the latter end of December. Christmas day was bright and sunny, with soft westerly breezes, and no frost at all at night. The following day, Sunday, was even still more sunny and warm. It was so genial in fact, that out of the thousands of people who were promenading about, one noticed more without than with their overcoats. If it be true that "A green yule makes a fat churchyard," I am afraid this season's crop will be amazingly large; that is to say, if we may proceed to reason out the matter, in proportion to the opposite effect of a healthy old frost. People are not satisfied, however, with this exceptional weather. They are not like Judge Pitman, who (Max Adeler relates) was happy in any weather, whether rain or fine, foggy or clear, hot or cold. People here are shaking their heads, although they cannot resist the cheery influence of the present, and gravely predict that we shall have to pay for "this" before long. They are probably not far wrong, but, as a people, we are so pig headed as to like to enjoy ourselves at Christmas, no matter what the elements are doing. The more frost and snow the better—simply because we can then add skating and sliding to our list of means of enjoyment. If these conditions are not forthcoming, we must do the best we can without them, a determination which demonstrates how wonderfully accommodating and expansive human nature (one might almost add "human stomachs") is at "this festive season." This, of course, so far as business comes in question, is simply a *laissez aller* line of temporary policy. But, then, my dear sir, there is no business doing in these three kingdoms to-day, nor has there been for two or three days past. At the present time we, as a race of money hunters, have thrown aside our flesh pots, and are for the time being devoted to wine, cigars, good eating and the round of visiting to which all social people are condemned. We forget all about number ones, twos, and threes. We have lost all thought as to the relative prices of Gartsherrie and Coltness, whether f. o. b. or not, and we are fearfully careless as to what may become of "that contract," which has been our curse for many days and nights, too, prior to Christmas eve. We have our boys and girls home from school. We are united in family bonds once again. Bright girls throw their glinting lights on merry little faces and on the beaming countenances of the old people watching the youngsters play. The bonds of money getting are for the nonce burst asunder, and we are for the time being decent human beings, which we shall soon be so tired of that we shall rush back to business with redoubled energy and keenness.

THE BRITISH IRON TRADE ASSOCIATION.

This association, to the preliminaries of which I have already alluded, appears likely to gain a good footing, and to be of great service to the

trade in a commercial sense. Mr. Isaac Lowthian Bell occupied the chair at a meeting held in London last week, and in an opening address explained the objects of the proposed association. A number of gentlemen were appointed members of the first Board of Management, and they were requested to select others to make up the number to thirty-six. Amongst the number selected are Mr. Whitelaw, M. P. (Glasgow); Mr. J. T. Smith (Barrow Works); Mr. G. T. Clark (Dowlais); Mr. Curtis (Ebbw Vale); Mr. E. Fisher Smith (Dudley); Mr. R. Heath, M. P. (Stoke), Mr. Isaac Lowthian Bell, M. P. (Middlesborough), and many other prominent gentlemen from Sheffield, Leeds and Birmingham. On the motion of Mr. I. L. Bell, M. P., seconded by Mr. E. F. Smith, Mr. G. T. Clark (Dowlais Iron Works), was elected the first president of the association, Mr. Jones being chosen as secretary. The general objects of the combination were declared to be these:

"To secure a means of communication between members of the iron and steel trades of Great Britain upon all matters bearing upon the commercial interests of those industries; to procure and circulate detailed statistics of the iron and steel trades both at home and abroad; to attend to all matters connected with foreign tariffs, commercial treaties and home parliamentary business that may have a bearing upon the position of the iron and steel trades, excluding questions of the regulation of wages or of a purely local character, and generally to take all proper measures for advancing the interests of the British iron and steel trades in all their branches."

All persons or firms in the iron or steel trades can now, and up to March 31st, 1876, join by payment, after which admission will be by voting only. The annual meeting will be held in February in each year. It was further resolved to hold a conference in London in February or March for the purpose of discussing such matters as, in the opinion of the board, may require the special attention of the trade.

BRITISH RAILWAY IRON.

The *Mining Journal* thus discourses on the subject of railway iron abroad: "We are unable to report any improvement in the external demand for our railway iron. The exports for the whole of November only amounted to 33,621 tons, as compared with 47,804 tons in November, 1874, and 70,781 tons in November, 1873. For the eleven months ending November 30th this year the aggregate exports were 521,833 tons, against 753,341 tons in the corresponding period of 1874, and 737,250 tons in the corresponding period of 1873. The decline which has taken place in this year's exports is ominous and marked; it is also widespread and general, the only foreign country of any note to which we have sent more of our railway material being Peru, which, by the way, is a nation not enjoying just now the very best credit. Canada, again, has been a larger consumer of our rails this year; and with regard to Canadian railway companies, as with reference to similar Peruvian organizations, caution is certainly required at present. The most pitiable feature, however, about our foreign railway iron trade is the utter collapse of the American demand. In November we only sent the Americans 44 tons of our railway iron, as compared with 1819 tons in November, 1874, and 17,919 tons in November, 1873. In the eleven months ending November, 30th this year we sent the Americans 17,755 tons of railway iron, while in the first eleven months of 1873 we dispatched 177,955 tons in the same direction, or about ten times as much. When our railway iron relation with the United States attained their greatest activity we sent them 40,000 tons per month. This was about four years since. The Americans with usual sanguine ardor were then unquestionably "overdoing" it in the matter of railroad construction, and a revulsion was sure to follow. This revulsion came in September, 1873, when the Northern Pacific Railroad Company colapsed, and the Jay Cooke panic commenced. But it is not to the Jay Cooke panic alone that we must attribute the lamentable disappearance of our American railway iron connection. When English railway iron became unduly dear, the Americans set to work to make rails for themselves, and so much success has crowned their efforts in this direction that we are now practically elbowed out of the American iron markets, although the Americans have still taken from us this year a tolerable quantity of pig iron. The decline in the demand for English rails in the United States is, there is little doubt, the primary cause of the troubles which now afflict the iron trade of South Wales. In the good old times, before Mr. Halliday began his far from useful labors, South Welsh iron found a ready outlet in the United States; but the South Welsh masters began to grasp at too large profits, and the South Welsh men struck for too high wages. The lamentable result has been that South Welsh iron has been edged out of one of the most important markets which it had gradually acquired."

SCOTCH PIG IRON.

The Glasgow warrant market opened steadily on Monday last, and prices were well maintained during the whole of the week. Their average daily was: On December 20, 62/10 to 63/6; on 21st, 63/3 to 63/6; on 22d, 63/6 to 63/10½; on 23d, 63/9 to 64/3; and on 24th, 64/3 to 64/7½; the average closing quotation being 64/3. There was a good season amount of shipping business, the total for the week amounting to 8159 tons, as compared with 7324 tons in the corresponding period of 1874. Freights are still unchanged, on the basis of 5/ to New York and 14/ to Boston. Connal's stores now contain 63,414 tons, the stock there having decreased during the week by 575 tons. Ballast pig remains at 47/6 per ton, alongside. The monthly average prices of warrants this and last year, and the comparative shipments in each year are as follows:

MONTHLY AVERAGE PRICES OF WARRANTS.

Jan.	Feb.	March.	April.	May.	June.
74/4	72/9	73/1	68/9	63 11	59/
106/3	95/	87/2	75/9	85/9	95/8½
July.	Aug.	Sept.	Oct.	Nov.	Dec.
60/4	63/0½	65/7½	62/3	61 2	..
81/9	85/8½	83/6½	84/7½	85/3	82/9

COMPARATIVE SHIPMENTS FROM 25TH DEC. UNTIL DATE.

		Tons.		Tons.	Tons.
1875.....	Foreign,	364,045,	coastwise,	167,938—	531,983
1874.....	"	289,913,	"	159,602—	449,515
Total increase in 1875....					82,468

Writing on December 24th, from Glasgow, Messrs. James Watson & Co. said: "The warrant market has steadily advanced during this week from 63/6 to 64/7½, cash, closing today buyers, 64/4½, sellers, 64/6. Shipments last week were 8156 tons, against 7324 tons in the corresponding week of 1874."

	No. 1.	No. 3.
G. M. B., at Glasgow	65/6	64/
Gartsherrie, "	74/	65/6
Coltness, "	78/6	66/6
Summerlee, "	70/6	65/6
Langloan, "	73/6	66/6
Carnbroe, "	67/6	65/
Calder, at Port Dundas	76/6	65/
Glengarnock, at Ardrossan	70/	65/6
Eglinton, "	64/6	63/6
Dalmellington, "	64/6	63/6
Shotts, at Leith	73/	65/6
Kinneil, at Bo'ness	66/6	64/6

Messrs. Wm. Colvin & Co., Glasgow, Dec. 28th, say: "The warrant market steadily improved all last week, and closed on Friday at 64/6. On Monday there was an extensive business done about 65/, closing with buyers at 64/9, cash. To-day the opening price was 65/, cash, and after numerous transactions about that price the market closed with sellers at 65/, and buyers at 64/10½. There has been an active demand for makers' iron during the week, and prices have advanced 1/ to 2/ per ton."

	Delivered alongside. No. 1.	No. 3.
G. M. B., at Glasgow	66/	64/6
Gartsherrie "	75/6	66/6
Coltness, "	79/6	67/6
Summerlee, "	71/	66/
Langloan, "	75/6	66/
Carnbroe, "	68/6	65/
Monkland "	66/	64/6
Clyde "	66/6	65/
Goven, at Broomielaw	66/	64/6
Calder, at Port Dundas	77/6	66/
Glengarnock, at Ardrossan	71/	66/6
Eglinton, "	65/6	64/6
Dalmellington,"	65/6	64/6
Carron, at Grangemouth	66/	..
Carron, " specially selected	70/	..
Shotts, at Leith	74/6	67/6
Kinneil, at Bo'ness	66/	63/
Bar Iron	£8. 0/ to £8. 10/	
Nail Rods	£9. 0/.	

SHIPMENTS.

	Tons.
Week ending Dec. 25, 1875	10,526
" Dec. 26, 1874	6,084
Increase	4,442
Total Increase for 1875	86,910

Messrs. John E. Swan & Brother's (limited) report:

Glasgow Brands.	Furnaces B'wing, 114	Furnaces Out 30.	Furnaces Built, 134.	Prices. No. 1.	No. 3.	No. 4
Gartsherrie	13	3	16	74/	65/6	66/
Coltness	12	0	12	78/	66/	..
Summerlee	5	1	8	70/	64/6	66/
Langloan	6	0	8	73/	66/	66/
Govan	4	0	5	65/	64/	65/
Calder	3	1	7	*75/	65/	66/
Shotts { Bess'mer	2	0	2	80/	..	..
Shotts { Ordinary	3	1	4	72 6	66/	..
Carnbroe	4	2	6	67/	64/6	66/
Wishaw	2	0	3	..	..	..
Monkland	6	0	6	65/	64/	63/
Chapelhall	3	0	3	67/6	..	..
Clyde	5	0	6	65/	64/	..
Quarter-Clyde	4	0	4	65/	64/	..

*f. o. b. Glasgow, 1/ per ton, extra.

Glasgow Warrants, 3-5 No. 1; 2-5 No. 3, g. m. b., 64/6.

WEST COAST BRANDS—*f. o. b. Ardrossan.*

Glengarnock		7	2	9	69.6	65/ 65/
Ardeer		4	1	5		
Eglinton	Brand'd	6	2	8		
Lugar	Eglint'n	4	0	4	64/6	63.6 63.6
Muirkirk		3	0	3		
Portland		3	3	6		
Dalmellington		6	2	8	64/	63/ 63/

TRADES OF SHEFFIELD.

The week has not been productive of any trade matter of interest, either in respect of the demand or prices. Most of the iron works last week run full time in order to clear order books prior to the holidays, which commenced on Friday afternoon. In Derbyshire I notice there is a tolerably large number of furnaces blowing at the principal establishments where foundry work is done on an extensive scale. At the Sheepbridge Works, near Chesterfield, four furnaces are in blast; at Clay-cross the majority of them are blowing, and at Stanton, two, I am informed, are in operation. The Staveley Works are, of course, doing what may in these times be characterized as an exceptionally good business all round, the furnaces being chiefly utilized in providing pig for the foundry. The Parkgate Company, near Masboro', have again put a furnace or two in, and are this week running a fair proportion of their mill machinery. At Thorncliffe and Elsecar Works the furnaces are kept going, partially on native and partly on Northamptonshire and Lincolnshire ores. The Thorncliffe establishment enjoys almost a complete monopoly of the little remaining iron deposits in that locality—excepting the mines of Earl Fitzwilliam, from which the Messrs. Dawes—of Milton and Elsecar—derive good supplies. At Sheffield the Atlas furnaces are to a considerable extent used for making spiegeleisen, which, if I am rightly informed, meets with a good demand for Bessemer purposes. Some of the blast furnaces at other local works are at present idle. Pig iron remains in tolerably steady request all round, although foundry numbers have the readiest sale. Local figures are unchanged. Hematite pigs are well upheld at the undermentioned quotations: Millom Bessemer No. 1, 80/; No. 2, 77/6, and No. 3, 75/; ordinary No. 3, 72/6; No. 4, 71/6; No. 5, 71/6; mottled, 80/; and white, 80/, on the usual four months' terms, or with 2½ off for cash. Maryport hematite No. 3, 72/6; No. 4, 72/6; No. 5, mottled and white, 72/6; Bessemer No. 1, 80/; No. 2, 77/6, and No. 3, 75/ per ton, less 2½ for cash. In finished and merchant iron generally there is no change whatever to note, common bars being quoted at £8 and even under, at which figure there can, of course, be no profit for the competitive markets; fair medium bars at £9 to £10, good at £11. 10/, and best ordinary £12. Low Moor and Bowling are still £21. 10/. Hoops are in rather better request at one or two establishments, the average price being £11. 10/ to £12 per ton. The cast steel industry grows worse weekly, and is likely, from what I have heard, to be almost wholly paralyzed. In at least one important instance a number of the men have this week been informed that their services will not again be required, and various propositions for more economical working have been enunciated, and will come into operation when operations are resumed in the new year.

The armor plate departments continue well engaged, as I have several times stated of late, and are likely to remain so for a long period hence. A communication from Chatham says that "great supplies of plates are arriving from Sheffield, the plates being 10 to 12 tons each. They are drawn from the station to the yard by means of a powerful traction engine. It is expected that 500 or 600 tons of these plates will be sent to Chatham during the next few weeks." Much of the work, however, is on account of foreign governments. A London correspondent of the Birmingham *Post* says: "The extravagant expenditure on armor plate is now so great that unless something can be done to reduce it, or the navy votes can be increased, it will drain all the blood out of the efficient strength of the navy, and a fleet of a dozen vessels or so will be all that we can afford. The mischief is intensified by the fact that the trade of armor plate rolling is a complete monopoly in the hands of two Sheffield firms, and I believe that £70 and £80 per ton have been paid for plates for the Inflexible. The government dare not commit themselves to a manufactory of their own. The cost of the plant would be too great, and Parliament has steadily set its face against dockyard manufactories. Moreover, if the manufacture of armor plates should be commenced, the probability is that in a few years they would be superseded." The correspondent is correct as to the trade being a monopoly in the hands of the two local firms, but I believe the price he names is at least 20 to 25 per cent. in excess of that actually paid by the government.

The annual meeting of the members of the South Yorkshire and North Derbyshire Coal-owners' Association (Limited) was held at Sheffield on Monday last, and a satisfactory report was tendered. The coal trade is good, especially in household qualities. Steam coal is not so much inquired for, now that the holidays are so near at hand. At Manvers Main and other pits in South Yorkshire the miners have had differences with the owners on the question of additional payment for wedging instead of blasting—a practice which is, by common consent, abandoned, that is whilst the men are down in the workings. In stone drifts it must still be used—but the miners ought even then to be out. The inquest as to the cause of the Swaithe Main explosion has now been adjourned until January 13th, after a daily sitting up to Tuesday. A quanity of valuable practical evidence has been given. For instance Mr. Brevor, manager of the Higham Colliery, said there was no really safe lamp yet invented; any lamp would explode if the gas were dense. He had known an explosion caused by a sudden rush of gas to the ventilating furnace—an explosion which caused great damage and killed a number of horses, but luckily did not kill the only man who happened to be in the workings at the time. On Tuesday Mr. Miller, of the Stafford Main Colliery, said that in the No. 2 rise board there is a goaf of 12 acres in extent. Some of the props supporting the roof of this goaf had been removed, so that there was a great fall, which liberated a quantity of gas. This had either exploded at a broken lamp or had gone off at a perfect lamp. Mr. Wilson, of the Oaks Colliery, confirmed this, but was further of opinion that there was also a second explosion in the Northslant level. Neither gentlemen believe in the theory of the accident having been caused by a shot.

In the cutlery trade and, indeed, all other branches of manufacturing industry, no work will be done here this week. The shares of "Wm. Jessop & Sons, limited," have gone off very rapidly, the applications being said to have been greatly in excess of the number of shares to be allotted. The directors qualification is the holding of 100 shares of £50 each.

THE BRITISH LABOR MARKET.

The *Labor News*, which professes to have special sources of information in its issue of Dec. 22d, gave the following summary: "The home labor market has undergone few important changes during the past week. Several branches, specially the iron, continue much depressed, and with the approach of Christmas a further suspension of work is likely to take place. At Middlesbrough great distress prevails among the iron workers, and the action of the ironstone miners, with respect to the proposed reduction of wages, is still uncertain. At Dudley the works are somewhat better employed, but the general outlook in the iron trade is very gloomy. In South Wales there are some rumors of reopening certain large works, but generally there is little doing. The slate trade is, however, specially brisk in North Wales. At Barrow a few good orders for iron shipbuilding have been obtained; and at Barnsley mills and forges are still fairly well off for work. At Hartlepool the iron shipbuilding yards are somewhat busier; and at Sheffield some of the staple trades, especially the electro-plate, are fully occupied. In the textile branches there is a fair amount of employment, and at Bradford spinners are well employed. At Halifax only a limited amount of machinery is going. There is still a demand for factory hands in some parts of Lancashire. Under the head of emigration an extensive loan for railways at the Cape of Good Hope may be noticed; and a continuous demand for labor in South Australia is also observable. Both from New Zealand and Canada letters of complaint on the part of disappointed emigrants have lately been published, indicating the necessity of organization for the distribution of emigrants on arrival in the colonies. Large numbers of persons remain unemployed in New York and other large cities in the United States."

BIRMINGHAM AND STAFFORDSHIRE.

There was rather more activity up to Christmas eve in the Staffordshire mills and forges, but the real condition of trade is unchanged. Prices remain nominally firm. Only 65 furnaces are in blast in the district. Best bars are still £10, and sheets £11 to £13. One or two firms have lowered their charcoal sheets, but the reduction is exceptional, Messrs. Baldwin and the Hope Iron Company still quoting £23. The hardware trades were busy last week, but are now holidaying. In the fire iron and brass hinge trades advances in prices are likely, owing to an agitation by the workmen for higher wages.

SOUTH WALES

remains quiet, as a rule, although at Dowlais and Ebbw Vale some work is being done. A correspondent writing on Friday says that at Dowlais there is £500,000 worth of steel rails now lying ready for delivery in the spring. He also states that experiments are being made at the same works in order to cheapen the cost of producing the Bessemer material, and these, if successful, would enable steel rails to be produced at very little more than the cost of iron ones. Dowlais has also the honor of having just produced the largest steel rail in the world. Ebbw Vale recently rolled one 89 feet long, but Dowlais has made one 105 feet and another 107 feet in length. This beats all yet done in this line. At the same works rails are being made and sent to Mantanzas and India. At the other establishments no noticeable change has taken place.

THE METAL MARKETS

were quiet last week. My usual advices and circulars not having come to hand, owing to some hitherto unexpected mishap, I am compelled, for the present, to dismiss the subject by saying that little has been done in any metal. Chili bars have ruled about £81. 10/ to £82. Amsterdam and English copper unchanged. Straits tin, £81. 10/ to £81. 15, and Australian £80. 10/.

Metallurgical Technology.

(Continued.)

Flattening Plate Iron.—In the Bay State Iron Works, at Boston, a very simple method for flattening plate iron can be seen in use; a heavy roller, worked by machinery, rolls over the plate, which is brought opposite to it; this roller is propelled by a rack and pinion, and, after moving over the plate, it is reversed and rolls back to its original position. In this instance, an old plate roll, with the coupling ends and part of the journal turned off, forms the roller weight employed.

Definition of Steel.—In the *Revue Universelle* and in the first and third of this year's numbers of the *Annuaire de l'Association des Ingenieurs sortis de l'Ecole de Liege*, we find the discussion still continued as to the true signification of the term steel, which commenced when Mr. Greiner, the head of the steel department of the Seraing works (whose name by a typographical error is spelt Gruner in our second report for 1873), defined steel to be any malleable product of the iron industry obtained in a state of fusion, an opinion to which Mr. Hackney, in his paper on the steel manufacture, read lately before the Institution of Civil Engineers, also subscribes; but as this would oblige us to class soft iron made by the Bessemer process, or pure iron cast in a crucible, as steel, although neither of these products will receive a temper, which from the oldest times has been looked upon as the all characteristic property of steel, we do not think Mr. Greiner's definition is likely to meet with universal acceptance.

Annealed Spiegeleisen.—As it is well known that the objection to the use of spiegeleisen in the production of the extra soft steel and Bessemer iron made by the Bessemer process is the high amount of carbon which it contains, for which reason ferro-manganese is always preferred in such cases, Professor Raymond has proposed in a paper read before the American Institute of Mining Engineers in February, to employ instead of the ordinary spiegeleisen; such as had previously been annealed, or, more properly speaking, decarbonized, by heating it for a considerable time with iron scale in a closed receptable, just as is done in the ordinary process of making malleable iron castings. Experiments were made by keeping an iron box filled with small fragments of German spiegeleisen packed in iron scale from the rolling mill at a red heat for some three weeks, when upon cooling it was found that the carbon was to a very large extent removed without the oxidation of the manganese having taken place in any sensible degree, the chemical analysis before and after the the process, made by Mr. J. Blodgett Britton, being as follows:

	Spiegeleisen before.	Spiegeleisen after.
Phosphorus	0·079	0·055
Manganese	11·636	10·689
Carbon	3·016	0·499

If the spiegeleisen had been granulated or cast in thin plates, or had it been of the quality rich in manganese such as is made at the West Cumberland Iron and Steel Works of the Societe Anonyme des Hauts-Fourneaux de Marseilles, the result would, no doubt, have been even more favorable, but at all events they tend to show that the high priced ferro-manganese is likely to find a much cheaper rival in such decarbonized spiegeleisen. The results have been published in the *Engineering and Mining Journal* of New York, for May 15, 1875.

American Bessemer Works and Iron Rolling Mill Plant.—The following details of the Edgar Thomson Company, Limited, situated at Braddocks, eleven miles east of Pittsburgh, on the main line of the Pennsylvania Railroad, may be of interest as showing the modern arrangements of an American Bessemer steel works and rail mill, considered capable of turning out 200 tons of ingots and 225 tons of rails if rolled in double lengths, or 200 tons if in single lengths, per day of 24 hours.

The total surface area of the entire works is about 106 acres, and, beside being traversed by the Pennsylvania and the Baltimore and Ohio Railroads, has a frontage of 3300 feet on the Monongahela River.

Buildings.—At present there have been erected: Cupola house, 107 feet long, 44 feet wide, and 46 feet high; converting house, 129 feet long, 84 feet wide, and 30 feet high; blast engine house, 54 feet long, 48 feet wide, and 36 feet high; boiler house, 178 feet long, 48 feet wide, and 18 feet high; gas generator house, 90 feet long, 46 feet wide, and 26 feet high; rail mill, 380 feet long, 100 feet wide, and 25 feet high, with a wing 100 feet long, 35 feet wide, and 17 feet high; office and shop buildings, 200 feet long, 60 feet wide, and 18 feet high; and coal and iron store, 40 feet long, 20 feet wide, and 10 feet high. All these buildings have iron roofs, and are constructed wholly of brick except the generator house and rail mill, which have iron side columns with timber side framing.

The converting appliances comprise three cupolas, each 40 feet high and 5 feet internal diameter; two 12 ton cupola ladles upon scales; two 5 ton converters, 15 feet high by 6 feet internal diameter; twelve crane ladles for casting, and a full supply of ingot molds and flasks for bottom casting. Ample stove capacity is provided for drying the spare converter bottoms, flasks and ladle stoppers. A crusher and mixing mill is in the cupola house, in which there is abundant room for storing the refractory materials intended for immediate use.

The steam machinery is worked by 16 tubular boilers, each 5 feet diameter and 15 feet long with forty 4½ inch tubes, a separate grate 5½ feet wide by 7 feet long, and a separate chimney 2½ feet internal diameter by 75 feet high; the boilers are fed by two duplex pumps, 10 inch by 5½ inch with 10 inch stroke, each having a direct cold water supply, and also a connection with either one of the two heaters, which are of the largest size, and supply the boilers with hot filtered water; each boiler has an independent lined safety valve, feed valve and blow off valve, and can be used or repaired independently of the others. For the converters, the two blowing machines have 42 inch cylinders with 4 feet stroke; each has two 20 ton fly-wheels of 20 feet diameter, a balanced slide valve on the steam cylinder, and rubber faced poppet valves on the air cylinder; the moving parts are balanced by an auxiliary piston in a small steam cylinder. A duplex engine is used for the cupolas with 18 inch steam cylinder, 60 inch air cylinder and 3 feet stroke. A horizontal engine, 18 inch cylinder by 2 feet stroke, drives the crushing and grinding machinery. Another horizontal engine, 36 inch diameter of cylinder by 4 feet stroke, with a 50 ton fly-wheel of 25 feet diameter, drives the blowing mill, whilst a similar engine 46 inch diameter by 4 feet stroke, drives the rail mill. A 3 ton steam hammer is used for cutting the blooms and for any hot chipping needed; an engine, 16 inch cylinder by 12 inch stroke, drives the rail saws, and another, of 18 inch by two feet stroke, the straightening presses, slotting machines and drills for the fish plate holes.

The hydraulic machinery comprises one duplex pressure pump with 25 inch steam cylinders, 9 inch water plungers and 2 feet stroke, and one pressure pump, 20 inch and 7½ inch by 15 inch stroke; a complete distributing apparatus, all valves of which are connected to a common platform; two accumulators, 16½ inch diameter by 9 feet stroke; a ladle crane, 15¼ inch diameter by 6 feet stroke; four cranes, 13 inch diameter by 9 feet stroke, of which three are for lifting ingots and one for the bottom casting flasks; two cylinders, 18 inches diameter by 9 feet stroke, with rack sand pinions for rotating the converters; one cylinder, 12 inch diameter by 2 feet stroke, fixed on a car, for lifting and removing the bottoms of the converters; and two lifts, 9 inch diameter by 27 feet stroke, for raising materials in the cupola house.

The heating furnace plant includes 20 gas generators arranged in 5 blocks, a sheet iron cooling tube leading overhead to the brick gas flue, and 6 Siemens furnaces, each 8 feet wide by 20 feet long internal measurement, the chimneys being two in number, each 6 feet diameter by 98 feet high. Three of these furnaces have hydraulic machinery for charging the ingots as brought in red hot from the converting house, and also for drawing them for rolling mill plant. The ingots are bloomed in a 30 inch three-high mill, which is fitted with feeding rollers driven by an independent engine, and with hydraulic cylinders for moving the roller tables, for turning over the ingots, and for moving the middle roller to vary the sizes of the grooves as required. A "telegraph" leads to the steam hammer, and a steam crane piles up the ingots in the yard, whenever it is inconvenient to take them direct to the reheating furnaces for the roll train. A 23 inch three-high train is used for rolling rails with three sets of rolls. A line of driven rollers leads to the saw carriage, and a second line of driven rollers to a 60 feet straightening plate. Space is provided for a swinging saw for cutting double length rails, and the hooks for handling the rails and rolls are provided with a power lifting apparatus to secure greater rapidity of working.

The water supply is brought from the river through 20 inch glazed sewer piping into a well at which two duplex pumps, each 20 inch by 7½ inch and 15 inch stroke are placed, and an 8 inch pipe from these pumps discharges into a 20,000 gallon tank, from which supply pipes are laid on to the works.

A complete system of 30 inch gauge railway tracks go all round the works, and a store room, laboratory and engineer's offices are to be found in the same building with the machine shop, which latter contains a 54 inch lathe for roll turning, one 30 inch and one 16 inch lathe, a 30 inch planing machine, two drills, a pipe, a screw-cutting machine, all driven by an engine of 12 inch cutter and diameter by 18 inch stroke.

We may, in conclusion, mention that a short description, with plan and elevation of the blooming mill engine at these works, will be found in the number of *Engineering* for January 22d, 1875, p 70, and in the number for March 12, p 206, is given a plate and description of the Bessemer blooming engine.

The Old and the New.—A writer in the Philadelphia *Ledger* says: The screw propeller has been in practical use less than 40 years, and yet its ideal origin runs back much further. Thomas Jefferson, writing from Paris in 1785, describes a vessel then recently invented, which he examined while in operation. He says the inventor did not know himself the principle of his own invention. "It is a screw with a very broad or thin worm, or, rather, it is a thin plate, with its edge applied spirally round an axis. This being turned, operates on the *air* as a screw does, and may be literally said to screw the vessel along. * * * The screw, I think, would be more effectual if placed below the surface of the water." Mr. Jefferson adds to his notes on this invention that he thinks Mr. Bushnell, of Connecticut, has a prior claim to the invention of the screw as a motive power for vessels. During the Revolutionary war he invented a submarine torpedo vessel, to be driven by screws. This torpedo was the original of Fulton's, and may have been the first instrument of its kind, but the screw had been suggested as a motive power for vessels long before the time of Bushnell. Brande's Dictionary says that "the screw propellor is probably as old as the windmill, and a windmill of the construction now usually employed is represented in the 77th proposition of Hero's *Spiritalia*, a work written 130 years before the Christian era." For a century and a half efforts were made to introduce the screw as a propeller of vessels before Ericsson and Smith successfully demonstrated the utility of the screw, and its advantages over paddle wheels. The history of this, as of most other inventions, shows that the world must wait for its laggards; that it cannot advance rapidly along one line of discovery, or of useful applications, until it has advanced or is ready to advance along others. Abnormal or premature growths are sure to be "nipped in the bud."

The Floods and the Iron Trade.—Whilst London is occupying itself in discussing what can be done for the poor people who have suffered loss by the overflowing of the Thames, and while precautions are being taken to meet the threatened higher tides soon to be experienced, the colliery and iron making districts are seriously debating their position arising out of the late heavy rains. In all parts of the kingdom pits have been stopped, and several iron works have been put to a stand. But nowhere has the inconvenience and loss sustained graver proportions than in South Staffordshire. The water has there made such an inroad upon the workings that it is threatening to stop the whole coal getting and iron making operations of that central coal basin.—*Engineer.*

A lot of plows and seed corn was shipped from Iowa, recently, to an extensive planter at Singapore, British India.

The Distribution and Consumption of Illuminating Gas.

The following interesting matter, which we condense from the address of Prof. C. F. Chandler, before the American Gas Light Association, will be found of especial value to gas fitters:

MAINS.

In the distribution of gas a certain percentage of leakage is unavoidable, but this can be reduced to a minimum by the exercise of a little care. The best plan is to test each length of pipe by closing one end with a plug, connecting the other end with a small forcing air pump, such as is used by gas fitters, and while the pipe is immersed in water forcing air into it. Bubbles of air passing the pipe will reveal every imperfection in the metal.

The location of each leak can be recorded by making a circle around it with chalk. Small holes can be closed by hammering the metal together; if large holes are detected, the pipe should be rejected. Immersing the pipes in hot coal tar is a very effective preventive of leakage. Leakage is said to often amount to 16 per cent. of all the gas produced, or even more; by the above mentioned precautions it may be reduced to 2 per cent. As there is always a certain condensation of water and oily or tarry matter in the mains, receivers or wells are constructed at convenient points, and the mains are laid inclining toward them. From time to time the condensed liquids are pumped out of the wells into a portable tank and thrown into the tar well at the works. Complaint is sometimes made of an excessive condensation of naphthaline in crystals or crusts, which seriously diminish the capacity of the pipes. According to J. Lawrence Smith, bituminized iron pipe is extensively used for gas in France. It is made from 1¾ to 28 inches in diameter. The base of the pipe is sheet iron, leaded, varying in thickness according to the required size and pressure; each section of pipe is made of two sheets, that are first riveted together separately with tinned rivets, and plunged into a bath of melted lead; these two pieces of pipe are then riveted together, and the junction of the two well tinned. The entire pipe is now 13 feet long. On the ends are convenient sockets and spigots, made of a mixture of lead and antimony, which serve to unite the sections of pipe when laid in the ground. The exterior surface of the pipe is coated with tar, and around this is wrapped a cord; this cord is then covered with melted pitch, and the pipe then rolled in coarse sand until it has acquired a thickness of from one-fourth to five-eighths of an inch. Chameroy & Co., of Paris, manufactured between the years 1838 and 1867, of this pipe for gas, 3160 miles; for water 897 miles—of a total value of $7,708,400.

THE METERS.

Nothing is so mysterious to the gas consumer as the meter, and yet, as a matter of fact, the meter is quite as accurate as any other measure in use. It does sometimes err, but its errors are almost always in favor of the consumer and against the companies. It cannot measure gas that does not pass through it, but may permit gas to pass through without registering the quantity.

It is unnecessary to explain the construction or working of the meter to this audience. I will say, however, that the measurement of gas presents difficulties not encountered in any other case. The gas must be measured while in actual use, as no system of measurement and storage would be practical. Its flow must not be interrupted in the slightest degree, as otherwise the lights would be extinguished, or at least be made to flicker in a manner that would be unendurable, and while its flow is interrupted its volume must be accurately recorded.

COMPARATIVE ADVANTAGES OF WET AND DRY METERS.

Wet meters being simpler in construction, composed entirely of metal, and having no valves except the float, are most durable and less likely to get out of order. They are, however, liable to stop from freezing, from too much or too little water, and from sending moisture into the pipes. They also register vapor of water as gas, though the quantity is too small to be of any consequence. The dry meter is not liable to any of these objections, but being more complicated and more delicate, it is more liable to wear and to get out of order. The inaccuracies which result from wear or corrosion are generally in favor of the consumer, as gas leaks from one space to another and escapes being measured. The dry meter is now more generally used.

The accuracy of the meters is very often questioned by the consumers. The resemblance of the dials lead them to infer that, like clocks, the meters may run fast or slow. But the case is not parallel; the meter is an engine in which the gas is the motive power, and unless the gas passes through the meter, it cannot move. On its dials are faithfully recorded the number of its revolutions in cubic feet. All waste and leakage is recorded as well as the useful consumption. Some think that the increased pressure makes the meter spin round faster and record against the consumer; but if he regulates the burners so as to prevent "blowing," he at once neutralizes the effect of the increased pressure. From the nature of things, the injury which the meter suffers in use must generally be against the company. If a valve leaks or a rust hole occurs in the measuring drum, or a crack in the leather, gas gets through without being recorded. Sometimes the valves of a dry meter become fixed in such a position as to let the gas through without moving. The meters are tested by State Inspectors by passing a certain number of cubic feet through each, and noting whether it is properly recorded on the dials. In New York and Massachusetts a meter is stamped correct when it varies less than 2 per cent.; in Ohio the tolerance is 3 per cent. Prof. Wormley, State Inspector for Ohio, in testing 2321 new meters found only 13 that varied over one-half of 1 per cent. Mr. Stimpson, State Inspector in Massachusetts, in one year tested 11,316 meters; only 148 failed to come within the requirements of the law. Very few of these varied 5 per cent.; 62 averaged 8·47 per cent. against the companies; and 85 averaged 4·5 per cent. short.

BURNERS.

Far too little attention is paid to the character of the burners. There are three forms of burner in common use, the "bat wing" or slit burner, the "fish-tail," and the "argand."

The amount of light produced by a given gas varies enormously with the conditions under which it is burned. The maximum amount of light is obtained by burning it on the verge of smoking, while in the Bunsen burner, used for heating purposes in chemical laboratories, the flame is blue and non-luminous. The loss of light is due to a too rapid mixing or contact of the gas with the air. This is controlled by the size and shape of the holes in the burner, the hight of the chimney, and the distribution of the air (in the argand), and in all cases by the pressure. The holes and slits for rich gas should be small, as such gas requires more air than poor gas. Under the same pressure a burner which consumes four feet of gas per hour gives more light than two burners consuming each two feet. There is no economy of light in small burners. The pressure of the gas is a most important consideration. Argands give most light under a pressure of 1-10th inch, bat-wings and fish-tails under a pressure of 3-10th to 4-10th inch. As gas is supplied to consumers under pressure varying from three or four inches down to 1-10th, it is very desirable to check the flow of gas when it is excessive. This can be done by the use of regulators, by turning the gas off at the meter, by partly closing the cocks on the fixtures, or by introducing a check into the burner. Check burners should always be used; they are constructed in various ways—always by placing some obstruction in the way of the gas to retard its escape. A very simple plan is to screw a five or six foot burner over a three or four foot burner. With regard to a choice of form, the argand is best for ordinary gas; it gives a very steady flame, and consumes the gas to the best advantage.

Batwing burners cannot be used in globes or shades, as the flame is so broad as to crack the glass; fishtails, or the peculiar form of bat-wing burner known as having the "excavated head" must be employed. The material of which the burner is constructed is a matter of great importance, iron rusts and the size and form of the openings become considerably modified in consequence; brass is better, but the best material is soap stone, usually called "lava." The best burner is Sugg's London burner, a lava argand. The best burner to be had in this country is Gleason's noiseless argand, of brass, provided with a regulator, which serves as a check. Most of the "patent burners possess very little value, the merit generally consists in a check of some kind; none of them are equal to the properly constructed lava tipped bat-wings, fishtails, and argands provided with simple checks. Some of you remember the monstrous swindle which was attempted a few years ago in this city with the Cremin burner. It was proposed to place this patent burner, together with a tin reflector, the whole costing perhaps a dollar and a half, on every public lamp, at a cost to the city of $15 each. As there are about 20,000 street lights, the swindle would have cost the city $300,000, without furnishing any additional light. The head of the Department of Public Works at that time, Mr. Tweed, refused to countenance such a fraud, and the scheme failed in consequence.

The gas referees of London made a report in 1871 on the subject of burners, in which some points are established which are of great importance. They found that by using good burners instead of bad ones, consumers may obtain from 30 to 50 per cent. more light, while their gas bills remain the same. The improvement of burners is important as a sanitary reform, as in furnishing the same quantity of light the good burner will consume less gas and consequently air, and will produce a smaller quantity of the products of combustion, and less heat than a poor burner. Burners from two newspaper offices gave only half the illuminating power of the gas, while several of the burners tested gave only one quarter the proper light of the gas.

These facts and many others which came to their knowledge proved to the referees that "an enormous waste of gas prevails, with a corresponding pecuniary loss to the public."

London pays $10,000,000 per annum for gas, and the referees believe that one-fourth this sum may be saved by the use of good burners.

The best burner yet constructed is "Sugg's London Burner" (argand lava), calling the illuminating power of its flame, when consuming five feet of fifteen candle gas per hour, 100, the following were the best results obtained from several burners.

FISH-TAIL BURNERS.

	Pressure inches.	Consumption of gas per hour.	Illum. power. Sugg's London No. 1. at 5 feet =100.	Illum. power calc'd to a consumption of 5 feet.
No. 1	0·2	1·7	12·2	36·
" 2	0·3	3·1	38·4	62·
" 3	0·45	3·3	34·3	52·
" 4	0·17	2·	18·8	47·
" 5	0·5	1·8	6·8	19·

BAT-WING BURNERS.

No. 7	0·3	5·	86·5	86·5
" 8	0·3	4·9	75·6	82·2

ARGAND BURNERS.

No. 9 Sugg's Lond. No. 1	0·213	5·	100·	100·
" 10 Common.	0·22	5·6	89·1	78·8
" 11 "	0·78	5·8	90·6	77·4
" 12 "	0·6	5·2	34·7	34·3

It is thus seen that the six bat wing burners tested, burned under the most favorable pressures for each, gave only from 19 to 62 per cent. as much light as Sugg's London burner, for the same consumption of gas, five feet per hour; the two bat wing burners from 82·2 to 86·5 per cent., and the three Argands from 34·3 to 78·8 per cent.

The loss of light by the use of shades, chimneys, etc., is very considerable, and largely due to the conversion of light into heat. The following numbers, selected from the results of William King, of Liverpool, and Prof. F. H. Storer, of Boston, are a sufficient illustration:

Description of Glass.	Thickness of Glass. Inch.	Loss of Light.
Clear glass (King)	..	10·57
Ground glass "	..	29·48
Smooth opal "	..	52·82
Ground opal "	..	55·85
Thick English plate (Storer)	⅛	6·15
Crystal plate "	⅛	8·61
English crown "	⅛	13·08
Double English window "	⅛	9·30
Double German (Belgian) Storer.	⅛	18·00
Single German " "	1-16	4·27
Double " " ground (Storer)	⅛	62·34
Single German (Belgian) ground (Storer)	1-16	65·75
Berkshire, Mass., ground (Storer)	1-66	62·74
Orange col'd window glass "	1-16	34·48
Purple " " "	⅛	83·11
Ruby " " "	1-16	89·62
Green " " "	1-16	81·97
A porcelain transparency	1-16	97·08

Lighting gas by electricity has recently been introduced in theaters, halls, etc., with great advantage. As it is an instantaneous operation, it results in great economy by rendering it unnecessary to light the gas before it is actually wanted, and in sparing the attendants the great exertion required in applying the torch at great hights. It may be effected by stretching a fine platinum wire above each burner, and heating it to a white heat by a current of electricity when the gas is turned on. A better plan is to use the Ruhmkorff coil. In this case each burner is isolated from the house pipes by a hard rubber connecting ring. A series of wires is then arranged by which the electric current is made to leap in sparks to the tip of each burner in succession when the gas is turned on. Systems have been invented by which the gas of the street lights is turned on and off and lighted by electricity from a central office.

Pressure.—As already stated, a certain amount of pressure is required to force the gas through the street mains, the house meters, pipes and burners. The pressure is measured by the hight of a column of water supported by the gas in a U-shaped tube, one end of which is open to the air, while the other is connected with the gas supply. It is estimated that there should be a pressure of one inch at the entrance to the premises of every consumer, 0·2 inch being required to force the gas through the meter, 0·2 inch for the house pipes, and 0·6 inch for the burners. This pressure is exerted by the weight of the great gasholders at the works. Were the consumption of gas uniform during the entire twenty-four hours, the holder could be properly balanced once for all, and a uniform pressure would be exerted at all times—four or five inches are found to be necessary for large districts; but when no gas is burned, no pressure is required, and when little gas is burned, four or five inches would be excessive. Consequently, the pressure must be graduated according to the hourly consumption. For this purpose the governor, already mentioned, is employed at the works to regulate the flow, and consequently the pressure, of the gas from the holder to the street mains. The following table exhibits the variation in pressure caused by irregularities of consumption. The holders of the New York Gas Light Company are on East Twenty-first street; its district extends from Grand street to the lower end of the island at Whitehall street. Hester street is well within the district.

PRESSURE OF THE GAS IN INCHES OF WATER.

	3 p. m.	4 p. m.	5 p. m.	6 p. m.
Twenty-first street	1·7	2·	5·5	4·2
Hester street	1·6	1·7	2·4	2·2
Whitehall street	1·0	1·	0·6	1·1
	7 p. m.	10 p. m.	12 p. m.	
Twenty-first street	2·9	1·9	1·0	
Hester street	1·9	1·6	1·2	
Whitehall street	1·1	1·0	0·8	

It is thus seen that a uniform pressure throughout the district supplied is absolutely impossible. In order to secure a sufficient pressure at the extremities of the district, an excessive pressure must be produced at the intermediate points; and as the pressure must be varied from hour to hour at the works, it will vary at the premises of most of the consumers. The consumer must, therefore, regulate the pressure for himself; (1) by carefully adjusting the main cock at the meter; (2) by adjusting the cock at each burner; (3) by using check burners; (4) by attaching a regulator at the meter. It sometimes happens that the consumer cannot get sufficient pressure to supply his burners, when he, of course, fails to get the light he requires, and concludes that the gas is poor. This difficulty may be due to several causes: (1) insufficient pressure at the works; (2) the street mains are too small or obstructed; (3) the service pipe is too small or obstructed; (4) the meter is too small or out of order; (5) the house pipes are too small or obstructed; (6) the fixtures are obstructed; (7) the burners are too small, defective or obstructed. By comparing notes with neighboring consumers, and consulting an intelligent gas fitter, the real cause of the deficient light can generally be ascertained. In large buildings there should be a separate cock and regulator on each floor to prevent irregularity of pressure.

The illuminating power of gas is dependent upon several conditions: (1) liberation of solid particles of carbon from the olefiant gas and rich hydrocarbon vapors by the heat of the flame, or the oxidation of the hydrogen at points in the flame where the supply of oxygen is not sufficient for both hydrogen and carbon; (2) to the temperature of the flame, which renders the carbon particles luminous; (3) to the density of the materials burned; (4) to the density of the products. These conditions depend upon the chemical composition of the gas and the manner of its combustion. Gases rich in olefiant gas and heavy hydrocarbons furnish the most luminous flames. The character of the burner, the dimensions of the chimney with argands, and the pressure determine the manner of combustion by regulating the supply and admixture of air. A low pressure with a burner that secures a supply of air just sufficient to prevent smoking—*i. e.*, the escape of unconsumed carbon—secures the maximum amount of light. The pressure and quality of the gas being fixed, it was formerly supposed that the light produced was directly as the rate of combustion, and that consequently two like burners consuming each 3 feet of gas per hour would give the same amount of light as one similar burner consuming 6 feet. Recent investigations make it extremely probable that the amount of light increases as the square of the consumption. (*Farmers Theorem.*) Consequently, the light from the two burners would be 3×3+3×3=18, while that from the one 6 foot burner would be 3×6=36. Thus, the large burner gives twice as much light for the same consumption as the two small burners; hence, the economy of a few large burners over many small ones.

Carbureting or Carbonizing Gas.—It having been established that the illuminating power of gas depends upon the heavy hydrocarbon vapors, numerous means have been contrived and patented for adding such vapors to the gas. The materials available are the naphtha of coal tar, and the naphtha of petroleum or coal oil. Coal tar naphtha is by far the most effective, though most expensive. It consists of benzol, C_6H_6, and its homologues, which are very dense and very rich in carbon. Petroleum and coal oil naphtha consists of hydrocarbons of the marsh gas series (see petroleum), such as quintane, C_5H_{12}; sextane, C_6H_{14}; heptane, C_7H_{16}, etc., in which the ratio of carbon to that of hydrogen is less than half what it is in benzol, etc. Dr. Letheby (*Chem. News*, xi., 1865, p. 126), found that while 1 grain per cubic foot of gas of some naphthas increased the illuminating power 9 per cent., the same quantity of other naphthas raised it only 1·99 per cent. Under favorable circumstances he found that a gallon of coal tar naphtha would enrich 6000 feet of gas, adding over 10 grains per cubic foot, and increase its illuminating power 68 per cent., thus making it equal to 10,000 feet of the original gas. The practical gain is 4000 feet, costing the price of 1 gallon of naphtha, about $1. The conditions which effect the carbonization are, (1) quality of the gas, (2) quality of the naphtha, (3) construction of the carbureter, (4) temperature of the carbureter. The last condition is very essential to success. If the carbureter is placed in a warm situation the naphtha evaporates too rapidly, the gas becomes overcharged, and the flames smoke. The burners must be first adjusted to the character of the gas, and if the gas varies from day to day from irregularity in the carbonization, the annoyance becomes intolerable. Another difficulty arises from the condensation of the naphtha in the house pipes and fixtures, by which they become obstructed and cease to deliver gas. These difficulties have led to the ill-success which has attended this apparently logical method of enriching gas.

Bicheroux's Gas Furnaces.

Mr. Casson, manager of the Round Oak Iron Works, makes the following report of the results of experiments with Bicheroux's gas furnaces at that establishment:

"During the week ending November 13, 110 tons 4 cwt. 22 lbs. of puddled bar iron were put into these furnaces for the 16 inch mill, yielding 93 tons 2 cwt. of finished iron and 9 tons 17 cwt. 36 lbs. of ends; the waste in the furnaces was, therefore, 7 tons 4 cwt. 98 lbs. In the week ending November 20, the figures were: 108 tons 6 cwt. 10 lbs. put into the furnaces, yielding 93 tons 5 cwt. 84 lbs. of finished iron, and 9 tons 11 lbs. of ends; the waste in the furnaces was, therefore, 6 tons. 19 cwt. 40 lbs. The waste was consequently in the first week, 6·57 per cent. of the finished iron; in the second, 6·43 per cent., on the average exactly 6½ per cent., and all this though the mill was worked only on single turns, 6 turns a week, and the rolls had to be changed 24 times in the first week, and 25 in the second, or a little more than four times each turn. Last week, ending 18th December, the mill worked on double turn, 10 turns in all. The iron made amounted to the respectable quantity of 185 tons 13½ cwt., with a consumption of 66 tons 13 cwt. of coal, so that for every ton of finished iron only 7·18 cwt. of Staffordshire coal were consumed."

More favorable results are obtained on the Continent with good gas coal. Bicheroux's system has been applied with marked success to furnaces for Bessemer ingots, nearly all the steel works in Belgium and Westphalia using them. At Angleur, in Belgium, at the works of Messrs. Pastor & Co., 163 ingots of 285 kil. each, or in all 46,455 kil. (about 929 cwt.), were heated between 6 a. m. and 5 p. m., with a consumption of 3300 kil. of coal, or about 66 cwt. In other words, 100 kil. of steel ingots were heated with 7·1 kil. of coal, or 1 ton of ingots with about 1¼ cwt. of coal.

The system has been equally successful when adapted to puddling furnaces. Messrs. Bicheroux themselves have worked such puddling furnaces for years. At Ars-sur-Moselle, one of the latest firms who tried the gas puddling furnaces, had two furnaces provided with Bicheroux's producers, and the results during the first two months were carefully put down for every 12 hours. These furnaces do not require such large producers as heating furnaces, the producers are therefore built where the grate used to be, so that the thus altered puddling furnaces do not want much more space than before. The pig iron was first heated in the neck of the furnaces.

Average Results.		No. 4 Furnace. August.	Sept.
Number of charges for twelve hours.	Day shift	9·66	10·08
	Night "	10·30	10·03
Iron made	Day "	1,858 kil.	1,961 kil.
	Night "	2,018 "	2,028 "
Consumption of coal	Day "	709 "	712 "
	Night "	636 "	671 "
Waste of iron	Day "	15·0 "	14·1 "
	Night "	13·8 "	13·2 "
		No. 13 Furnace. August.	Sept.
Number of charges for twelve hours.	Day shift	9·57	10·—
	Night "	9·60	11·7
Iron made	Day "	1,885 kil.	1,935 kil.
	Night "	1,907 "	2,358 "
Consumption of coal	Day "	695 "	700 "
	Night "	663 "	871 "
Waste of iron	Day "	13·1 "	14·6 "
	Night "	12·7 "	11·7 "

The average consumption of coal per ton of iron made was therefore 6·72 or nearly 6¾ cwt. A number of prominent English firms are about to adopt these gas furnaces, which seems to have the great advantage of simplicity and easy management by the ordinary furnacemen, beside the saving of fuel and the reduction in the waste of iron.

Competition Between English and German Coal and Iron.

A correspondent of the London *Economist* writes: The proprietors of coal mines in Upper Silesia have held an assembly, in which measures were discussed which would render competition with English coal mines possible. They first decided upon naming general agents, who, in Dantzig and Rostock, are to be occupied in selling their coals. Then they intend demanding of the Secretary of the Board of Trade that the customs' duty, due for import of coals into Russia, should be done away with. Thirdly, the Secretary for the Board of Trade is to obtain reductions for them in the charges for railway conveyance to the ports of the Baltic. Along with the petition of German iron manufacturers to the government, in which the former demand a suspension of the law of 7th July, 1873 (abolition of all duties upon cast iron), a strange fact presented itself to public notice. During the time in which the duty on iron has been lowered, the Silesian iron works have progressed in quite an extraordinary manner:

Date.	Duty on Pig Iron.	Production of Pig Iron.	Duty on Cast Iron.	Production of Cast Iron.
	sgr.	cwt.	sgr.	cwt.
1847	10	1,349,307	45	772,094
1857	10	1,916,678	45	1,011,509
1867	7½	3,687,893	25	2,071,907
1869	5	3,913,783	25	2,686,399
1872	2½	5,899,758	17½	4,083,575
1874	....	5,434,924	10	4,107,299

We hear that there is to be a general reduction of wages in the course of this week in the establishment of Krupp. Fourteen thousand workmen's wages are to be reduced by 10 per cent. In the other Rhenish and Westphalian iron and steel works there is little else in store for the future. Since the 15th of September about 11,000 workmen have been dismissed from these, and it is much to be feared that by Christmas time many more will be dismissed. Distress is greatest in the iron industry. The other branches do not suffer much.

At a recent distribution of prizes at Greenwich, Mr. Gladstone delivered an eloquent address, in the course of which he said that one of the first results of elementary education was to produce a desire on the part of young persons or in their parents to escape from the necessities of manual labor, and pass into what is called head work. Here they had before them a very important subject. There was far too much eagerness on the part of the working classes to get out of the working class into another which was not a working class. The first thing a man ought to do was to elevate his vocation. A workman ought to strive to raise the character of the work he performed, and in doing that he was doing more to raise himself and his family and class than by hurrying out of his position. Hand labor was progressively and rapidly rising, whereas head labor was falling. The ex-Premier, in conclusion, urged that what the workingman should aim at was to raise the character of the labor which he was called upon to perform.

Edward Miller & Co., manufacturers of sheet brass, bronze lamps, trimmings, &c., Meriden, Conn., were established in 1844 and incorporated in 1866, Edward Miller, president, and William H. Perkins, treasurer. From 350 to 400 hands are now employed in their works, which consist of a three story brick building, 300 feet long, another of two stories, 200 feet long, a two-story tin shop, 100 feet in length, and a brass rolling mill, 190 feet long; in addition there are new buildings used for spelter castings, brass moldings, japanning, and joiners' shops. Five boilers furnish steam for the 150 horse Corliss engine, which furnishes the power. The concern is one of the largest of its class in the country, doing a $500,000 business. In the way of fine bronze parlor ornaments, &c., the company are successfully competing with foreign manufacturers'. Their New York city headquarters are at No. 4 Warren street.

President Orton, of the Ohio Agricultural and Mechanical College, is preparing a map, 10 by 12 feet, to be exhibited at the Centennial Exposition, showing, on a large scale, all the coal and ore mines, fire clay, furnaces, etc., and everything relating to the geological resources of Ohio.

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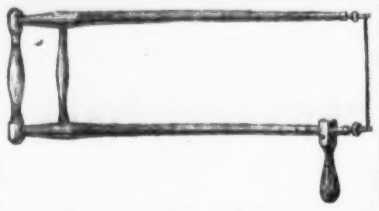

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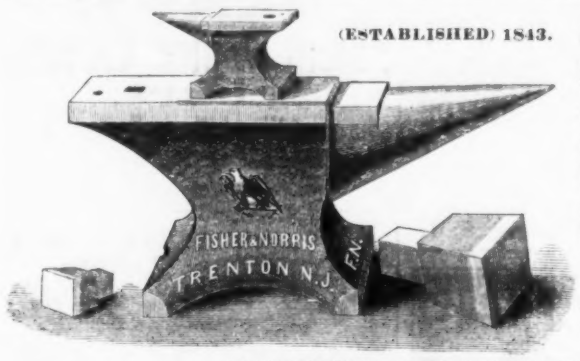

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These Anvils are *superior* to the best English, or other Anvils, on account of the peculiar process of their manufacture (invented and used only by this concern), and from the quality of the materials employed.

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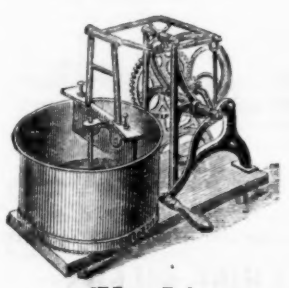

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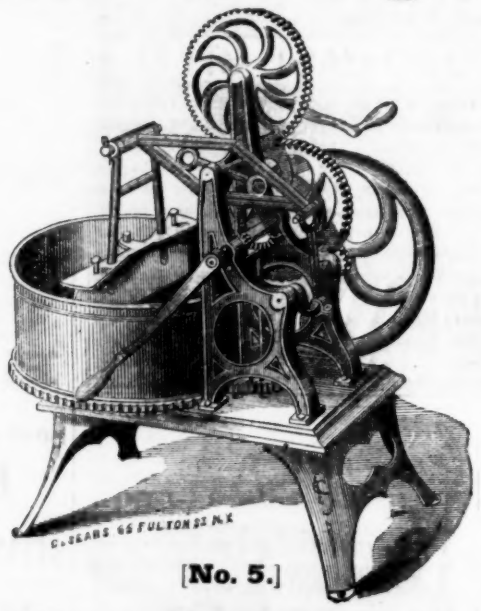

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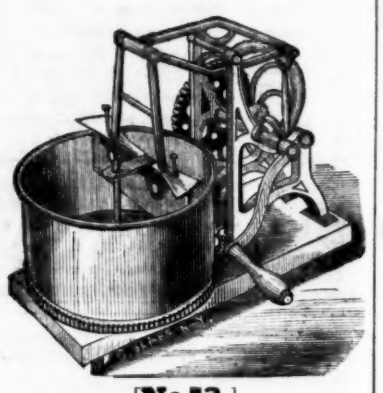

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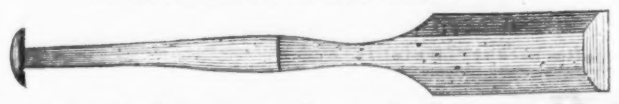

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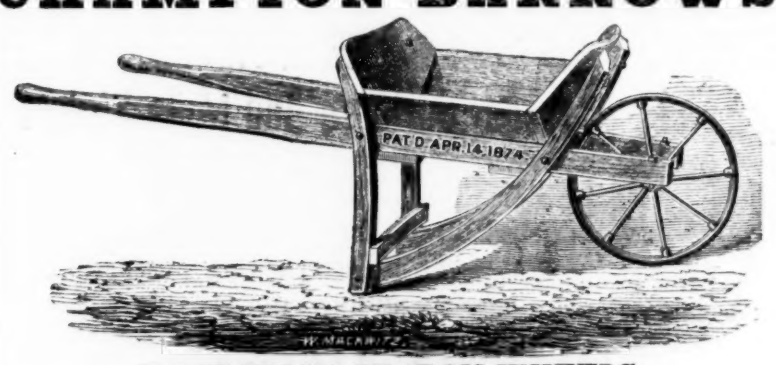

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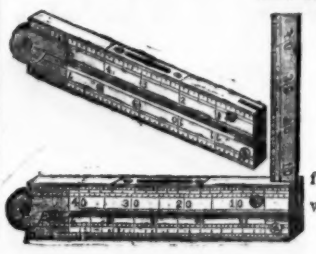

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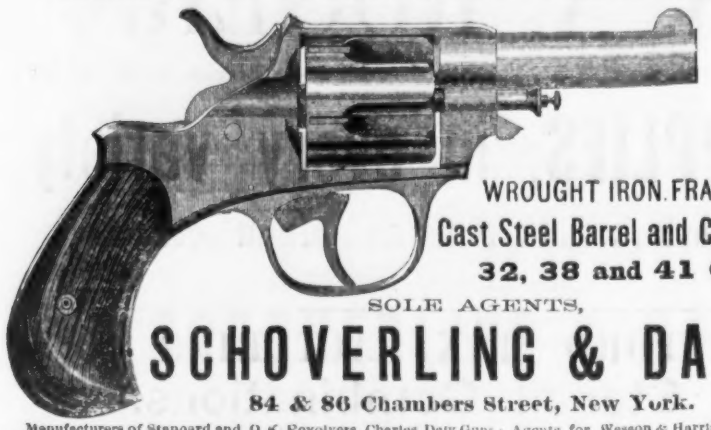

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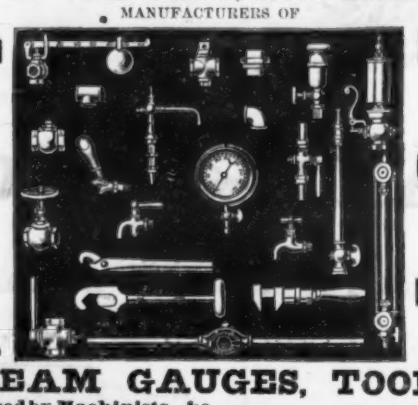

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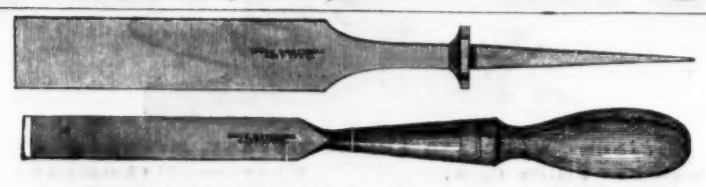
Guaranteed to clean better, last longer and work easier than any in the market. Removes all Carbon and Scale from the Boiler Tubes. Adopted and in use by United States Navy. For sale by dealers.
THE CHALMERS SPENCE CO., Foot East 9th St., N. Y., Agents for the United States.

Tredegar Horse and Mule Shoes.

These superior Shoes are made of the Best Virginia Charcoal Iron. They are well adapted to Western and Southern demand, and are shipped to all prominent markets at freights as low as on other makes.

THE TREDEGAR COMPANY, Manufacturers,
Tredegar Iron Works, Richmond, Va.

SEMPLE, BIRGE & CO., Sole Western Agents, **ST. LOUIS, MO.**



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The most complete assortment in the U. S. of **Shank, Socket Firmer, and Socket Framing Chisels,**

PLANE IRONS.

Gouges of all lengths, and circles beveled inside or outside. Nail Sets, Scratch and Belt Awls, Chisel Handles of all kinds. Orders filled promptly; generally same day as received.

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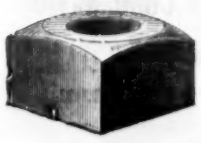

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HOT PRESSED NUTS

Of Superior Quality of all sizes, both

HEXAGON & SQUARE,

From ¼ inch to and including 1⅛ inch Bolt.

Factory and Office. - - - - - - WESTVILLE, CONN.

Pipe, Fittings, &c.

WROUGHT IRON

INDESTRUCTIBLE ENAMELED PIPE

For Water, Gas, Sewage & Soil Pipe.

Manufactured Solely by

NATIONAL TUBE WORKS CO.,

Also Lap Welded Steam & Gas Pipe & Boiler Tubes.

Tubing & Casing for Artesian, Oil & Salt Wells (with Patent Protecting Coupling),

A Specialty made of Large Wrought Iron Lap Welded Tubes, 8 in. to 14 in. diameter.

MACK'S PATENT INJECTOR, ETC.

Works and Offices at BOSTON, MASS., and McKEESPORT, PENN.

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St. Louis, 811, 813, 816 N. Main Street.

McNab & Harlin Mfg. Co.,

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BRASS COCKS

For STEAM, WATER and GAS.

Wrought Iron Pipe & Fittings, Plain and Galvanized

PLUMBERS' MATERIALS.

Illustrated Catalogue sent by express to the Trade on application.

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Wholesale Manufacturer of

Coal Hods,

FIRE SHOVELS, Etc.

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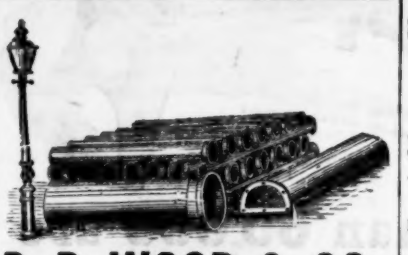
CAST IRON PIPES

FOR WATER AND GAS.

Branches Retorts, &c.

Warren Foundry & Machine Co.,

PHILLIPSBURG NEW JERSEY.



R. D. WOOD & CO.,

Philadelphia,

Manufacturers of

Cast Iron Pipe

FOR WATER AND GAS.

Lamp Posts, Valves, &c.,

Mathew's Pat. Anti-Freezing Hydrants.

400 CHESTNUT STREET.

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ENCAUSTIC TILES.

ALEXANDER FINDLAY,

Importer.

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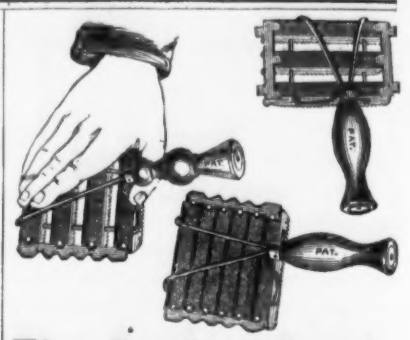

The Perfect Comb.

We call your attention specially to our new patent endless wire frame comb. The result of a long series of experiments, made with a view to meeting all the requirements of a *Perfect Comb*. It is better, stronger, and more durable than any ever before invented. The raised wire shank gives what has never before been attained, viz: a rest and brace for the thumb, in such a position that the hand cannot come in contact with the horse while using the comb. The wire braces which run from the shank over the back to the front teeth give strength and durability in a direction never heretofore attained, and at the same time serve as an extra handle; and when clasped by the fingers in connection with the raised shank the comb is more firmly, easily, and completely held, and with much less fatigue to the hand than is possible in any other formation—in short, it needs but a trial to vindicate its name: **The Perfect Comb.**

THE LAWRENCE COMB CO.

Factory and Office,

382 2d Ave., cor. 22d St., N. Y.

WM. S. CARR & CO.

Sole Manufacturers of

CARR'S

Patent Water Closets,

PUMPS,

Cabinet Wood Work, Vases, &c.

106, 108 & 110 Centre Street,

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BLAKEMORES GRAVITY DOOR ALARM
USE NO SPRING
MANUFACTURED 3425 MARKET ST PHILA PA
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EDWARD BARR,

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Tubes for Gas, Steam & Water

1-16 to 48 inch. **Gas, Steam Fitters', Plumbers' and Machinists' Supplies.** Boiler Tubes, Iron and Steel Boiler Plates, Rivets, Tools, Etc. Railroad Cars and all kinds of Railway Supplies. Iron and Wood Work for Cars, Bridges and Buildings.

Agent for W. C. ALLISON & SONS.

J. AUSTIN & CO.,

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Proprietors and Manufacturers of

WHEATCROFT'S SELF-ADJUSTING

Pipe Wrench,

AND

Scripture's Funnel Top

MACHINE OILERS.

Dealers in

STEAM AND GAS FITTERS TOOLS.

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New York Store, 95 Liberty Street,
Pittsburgh Store, 235 Liberty Street.

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SCALE AND TESTING MACHINE WORKS
PHILADA ESTABLISHED 1848

"Patented" Furnace Charging Scale.

Double Beam R. R. Track Scale, Compound Parallel Crane Beams, &c. Patented First Power Lever Wagon Scales. Testing Machines any capacity.

Send for Illustrated Price List.

CHAPMAN VALVE MFG. CO.,

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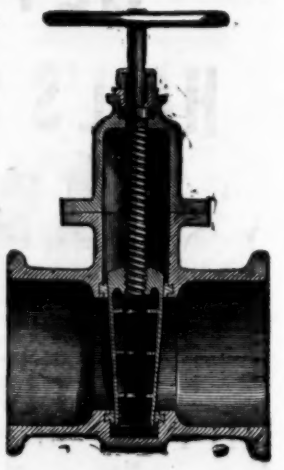
Water,
Gas
AND
Steam

VALVES.

Hydrants.



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The Iron Age Directory
and Index to Advertisements.

PEEKSKILL FIRE BRICK WORKS.
Established 1831.
HORTON & MABIE,
Manufacturers of
Fire Brick of all kinds,
STOVE AND RANGE LININGS
of every description. Linings for Cupola or Foundry Furnaces. Blocks, Tiles, McKenzie Cupola Brick, &c.
FIRE CLAYS, FIRE SAND & FIRE CEMENT.

Brick Presses.

BRICK PRESSES,
For Fire and Red Brick.
PATENT STEAM GEARING
For grinding Clay for Red or Fire Brick, and a kinds of **Brick Machines** in general.
Works, 1819 Germantown Ave., Phila.
GEO. CARNELL.

Oldest and Largest Establishment of the kind in the U. S
F. L. & D. R. CARNELL,
1844 Germantown Avenue, Philadelphia
Manufacturers of Pennsylvania Brick Machine Little Giant Pipe Machine, Fire and Red Brick Presses, Clay Wheels, Tile Machines, Stampers, Grinding Pans. Brick Yards fitted out for running by steam or horse. Heavy and Light Castings. Send for circular.

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Iron Works & Machine Shop.
MARCUS SCHANTZ,
Having established himself in the Iron and Machine Business in **Water St., Perth Amboy**, is now prepared to execute all orders in machinery, such as STEAM ENGINES, BRICK MACHINES, BRICK PRESSES AND TILING MACHINERY. Also, Steam Fitting, and Iron and Brass Castings, &c., furnished in the shortest time, and in the best and most workmanlike manner.

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Clay Tempering Machines
AND BRICK MAKERS' TOOLS.
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MANUFACTURERS OF
Continental Locks.
Excelsior Dividers.
Excelsior Calipers.
Axes of the celebrated brands
"Queen of the Forest."
"Wood Choppers' Pride."
Wetmore's Hatchets.
Tackle Blocks.
Brad Awls and Tools, (in sets
SOLE AGENTS FOR
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Baldwin's Solid Cast Steel Carpenters' Hammers, Mining and Blacksmiths' Sledges and Tools.
Davis Level and Tool Co.'s celebrated Patent Adjustable Plumbs and Levels and Inclinometers.
Improved Iron Bench Planes and other Tools.
Chapin Machine Co.'s Boring Machines.
Humphrey & Bartlett's Horse Brushes.
H. Chapin's Son's Rules, Planes, Gauges, Plumbs and Levels, Try Squares, T Bevels, Hand Screws, &c.
IMPORTERS OF
Stubs' Files.
French Coffee Mills, and General Hardware and Cutlery.
A complete and extensive stock always in store.
Catalogues mailed on application.


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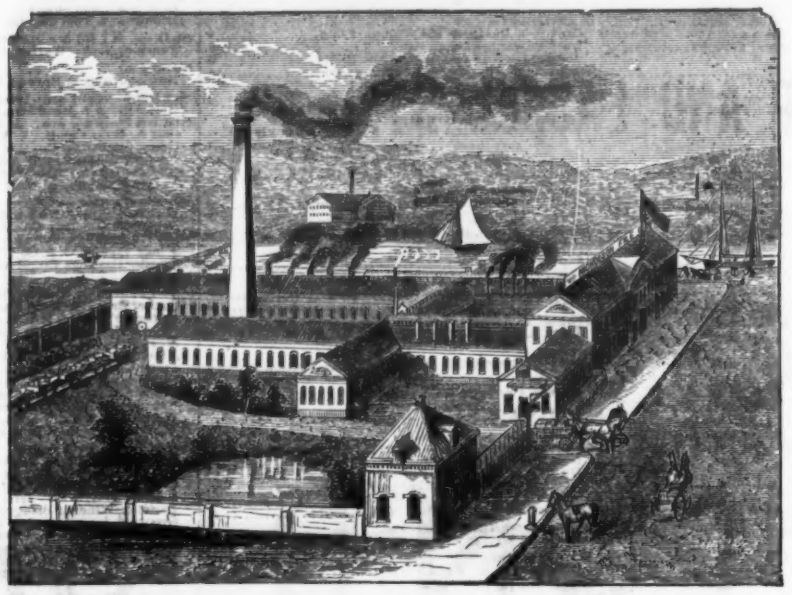
Treas. Valley Machine Co., East Hampton, Mass.
DEAR SIR: The "Wright Bucket Plunger Steam Pump" you built for the Government "works like a top." Am sure it has never had its equal in any of the departments, and I have no hesitancy in recommending this Pump to any one in want of a first-class, noiseless Steam Pump. Very respectfully,
J. THOS. MILLER,
Chief Engineer U. S. House of Representatives.
Send to us for Catalogue.
Valley Machine Co.

MINERS' CANDLES.
Superior to any other Light for Mining Purposes. Manufactured by
JAMES BOYD'S SON,
Nos. 10 & 12 Franklin St., N. Y.

B. KREISCHER & SON.,
New York Fire Brick &
STATEN ISLAND
CLAY RETORT WORKS,
Established 1845.
Office, 58 Goerck Street, cor. Delancy Street,
East River, New York.
The largest stock of Fire Brick of all shapes and sizes on hand, and made to order at short notice.
Cupola Brick, for McKenzie Patent, and others. Fire Mortar, Ground Brick, Clay and Sand. Superior Kaolin for Rolling Mills and Foundries. Stone Ware and other Fire Clay and Sand, from my own mines at New Jersey and Staten Island, by the cargo or otherwise.

NEWTON & CO.,
Successors to
PALMER, NEWTON & CO.,
ALBANY, N. Y., Manufacturers of
FIRE BRICK
Stove Linings,
Range and Heater Linings
Cylinder Brick, &c., &c,

Philadelphia Fire Brick
AND
Clay Retort Works,
AND KENSINGTON FIRE BRICK WORKS
Office, 23d and Vine, Philadelphia.
PHILIP NEWKUMET,
Successors to **JOHN NEWKUMET, Proprietor**
manufactures 9-inch Fire Bricks, Tiles, and Blocks for Rolling Mills, Blast Furnaces, Foundries Gas Works, Lime Kilns, Glass Houses, &c., &c
Articles of every description made to order short notice, and in a very superior manner.
"CLAY RETORTS FOR SUGAR HOUSES."



DEALERS AND CONSUMERS
OF FILES
SHOULD PURCHASE THE
Nicholson or "Increment Cut" File
FOR THE FOLLOWING REASONS:

First.—They are made from the best quality of File Steel.

Second.—Each File undergoes a careful inspection after each operation, by critical inspectors, and none but perfect work allowed to pass.

Third.—They are cut by the **"Increment"** or **irregular cut,** therefore combine the advantages of both Hand and Machine work.

Fourth.—They **will finish finer** than Files of any other make of same degree of coarseness.

Fifth.—They **will not "pin"** or scratch like hand-cut Files.

Sixth.—The **"Increment cut"** File, by our records, **will remove more stock with a given number of pounds applied** than any other File with which we are acquainted

Seventh.—All Files under seven inches are **put up in boxes** of one dozen each, and neatly labeled.

Eighth.—The large stock carried by us, combined with our superior facilities, enables us to fill the largest orders at the shortest possible notice.

Ninth.—We are constantly making careful tests of our Files by delicately constructed machinery, which **automatically records** the **actual power applied,** forward, backward and downward, at each stroke of the File, also the number of strokes, combined with the work performed, enables us not only to judge of the **quality of our Steel for wear,** but **also of the cutting qualities** of the File, and the ease (expressed in pounds) with which a given amount of work can be accomplished.

Finally.—Our Files **are warranted** to be **hard, well cut** and **sound.** They are exclusively used by many of the largest Railroads and Machinists in the country—and the vigorous growth of our reputation, not only for making a good article, but of **our ability to furnish a good article cheap,** is evidenced by the large number of Dealers and Jobbers who are handling our Files exclusively.

NICHOLSON FILE COMPANY, Providence, R. I.

SOLD BY HARDWARE DEALERS GENERALLY.

CROOKE & CO.,
MANUFACTURERS OF
WROUGHT IRON BUTTS,
All our goods are manufactured from patent faced iron plates; they have a smooth face and bright finish.
163 & 165 Mulberry Street, New York.
FERNALD & SISE, Agents, 100 Chambers Street, N. Y.

Burke & Fraser,
SOLICITORS OF
PATENTS
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Established 1851. *Also Consulting Engineers.*

PATENTS. Thomas D. Stetson, No. 23 Murray St., N. Y. Solicitor of Patents, and Scientific Expert in patent cases.
Send for circular.

Watson Fire Brick Manufactory
ESTABLISHED 1836.
JOHN R. WATSON, Perth Amboy, New Jersey.
Manufacturer of
FIRE BRICK,
For Rolling Mills, Blast Furnaces, Foundries, Gas Works, Lime Kilns, Tanneries, Boiler and Grate Setting, Glass Works, &c.
FIRE CLAYS, FIRE SAND, AND KAOLIN FOR SALE.

A. HALL & SONS, Perth Amboy, N. J.
ESTABLISHED 1846.
HALL & SONS, Buffalo, N. Y.
ESTABLISHED 1866.
FIRE BRICK
of reliable quality for all purposes, manufactured of the best New Jersey Fire Clays. Also, ROCKINGHAM WARE, YELLOW WARE, Fire Clay, Fire Sand, Kaolin Ground Fire Brick, and Diamantine Building Brick.

HENRY MAURER,
Late of the firm of MAURER & WEBER,
Proprietor of the
Excelsior Fire Brick & Clay Retort Works,
Sole Manufacturer of **French Pat. Roofing Tiles and Hollow Brick.**
WORKS: PERTH AMBOY, NEW JERSEY.
Office & Depot: **418 to 422 East 23d St.,** bet. 1st Ave. and Ave. A, **New York.**

BROOKLYN CLAY RETORT
AND
Fire-Brick Works,
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Manhattan Fire Brick & Enameled Clay Retort Works,
ADAM WEBER, - - Proprietor.
Office, **633 E. 15th St., N. Y.** Clay Retorts, Enameled for Gas Houses; Retorts for burning raw bone and re-burning bone for Bone Black. Fire Bricks, Flues, Blocks, Cupola and Range Bricks of all shapes and sizes. The best fire clay from my own Clay Beds at Perth Amboy, N. J.

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Manufacturers of
FIRE BRICK
And Furnace Blocks.
IN ALL ITS BRANCHES.
Woodbridge, - - - N. J.

National Fire Brick & Drain Pipe W'ks,
CHAS ANNESS & SONS, Props.,
Manufacturers of **FIRE BRICK** all shapes and sizes.
Miners and Shippers of all kinds of **FIRE CLAY.**
Factory at SPA SPRINGS, on Perth Amboy and Woodbridge, R. R.
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AND
Fire-Brick Works.
BELL & BACON.
Stove Linings a Specialty. TROY, N. Y.
JAS. C. BELL, JR. J. BLUNT BACON.

Established 1845.
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Fire Brick Works.
WM. H. BERRY & CO.
Manufacturers of all forms and sizes of **FIRE BRICK,** for Blast Furnaces, Rolling Mills, Gas House and Oven Flues, and Stove Linings, made to order. Also, Fire Clay, Kaolin, Sand and Fire Mortar.

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Before the
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A. H. SPENCER,
Solicitor of Patents,
And Expert in Patent Cases.
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OFFICES FOR PROCURING
UNITED STATES AND FOREIGN
PATENTS,
Forrest Buildings
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AND MARBLE BUILDINGS
605 Seventh St. (Opposite U. S. Patent Office,
Washington, D. C.
H. HOWSON, Solicitor of Patents. | C. HOWSON, Attorney at Law.
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brought or defended in any district of the U. S.

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In the U. S. and abroad, with special aim to strength and validity, and in shortest possible time. Pamphlet free. 345 Main St., Hartford, Conn.

New York Wholesale Prices, January 12, 1876.

HARDWARE.

Anvils.
Wright's........⅌ ℔ gold 10¾c; over 250 ℔s 11c, gold
Armitage's Mouse Hole........gold 11c
Wilkinson's........⅌ ℔ gold 11c
Eagle Anvils (American)........⅌ ℔ 10c dis 20 %

Apple Parers.
Domestic, Turn Table, Lightning, Hudson's, Reading, Union........$7.75 ⅌ doz
Skeleton Paring, Coring and Slicing........$8 00 ⅌ doz net
Bay State, Paring, Coring and Slicing........$15 00 dis 10 %
Climax Slicer........8 00

Ash Sifters.
J. E. Corning's Barrel Head........dis 10 %
Rival........⅌ doz $12·00 net
Square........per doz $2·50 dis 20 %

Augers and Bits.
Conn. Valley Mfg. Co., Douglass, Ives, Beecher (French, Swift & Co.), Griswold, Challenge........1st quality......dis 40&10 %
Nobles Mfg. Co........dis 40 @ 40 25 %
Cook's........dis 45&10&10 %
Diamond Hardware Co........dis 25&10&10 %
Snell Mfg. Co........dis 25 %
Jennings' Bits........dis 10 %
Lewis Single Twist Bits........dis 25 %
Andrews' Bits........dis 25 %
Griswold's Patent Bits........dis 30 %
Expansive Bits, Clark'....small, $18; large, $26—dis 15 %
" " Ives'........$20 @ $30—dis 30 %
" " Blake's........$20—dis 40 %
Hollow Augers, Douglass', Ives, French, Swift & Co........dis 40 %
" " Bonney's Adjust..⅌ doz $48—dis 25&10 %
" " Stearns' "..⅌ doz $48—dis 25&10 %
" " Ives' Expansive........each $4·50—dis 40 %
" " Universal Expansive.each $4·50—dis 10 %
Gimlet Bits—Screw, $7·50; no screw, $9......dis 20&10 %
Double Cut Gimlet Bits, Shepardson's........dis 30 %
" " Ct. Valley Mfg. Co..dis 30&10 %
" " Hartwell's........dis 50 %
" " Douglass'........dis 25&10 %
" " Ives'........dis 30 %
Morse's Bit Stock Drills, List of Jan'y 1, '76........dis 25 %
L'Hommedieu's Ship Augers........dis 20 %
Watrous Ship Augers........dis 20 %
Vaughan's Post Hole—6 in. $23 60; 7, 8 and 9 in. $25 per doz........dis 20 %

Awls, Brad Sets, &c.
Awls, Sewing, Common........per gross $1·20—dis 15 %
" " Best........per gross $1·60—net
" Shouldered Peg........per gross 2·25—dis 15 %
" Patent Peg........per gross ·60—dis 15 %
" Shouldered Brad........per gross 2·25—dis 15 %
Brad Sets, Aiken's........per doz $13·88—dis 40 %
" No. 42, $10·50; No. 43, $12·50........dis 45&10 %
" Clark's........dis 40&10 %
" Stanley's Excelsior........$13 50—dis 25&10 %

Axes.
Brook's........per doz $12 00 @ 14 00 net
Blood's........per doz $15 00 @ 16 50—dis 20 %
Hunt's........⅌ doz $12 50 @ 14 00
Collins'........⅌ doz 11 00 @ 15 50 net @ dis 5 %
B. Clark's (J. C. W. & Co.) bron'd or red.⅌ doz $10 00 net
Hurd's........⅌ doz 10 50 @ 12 50
Simmons'........⅌ doz 11 00 @ 11 50
Morris'........⅌ doz 12 50 @ 13 50
Red Jacket........⅌ doz 12 00 @ 12 50
Mann's........⅌ doz 11 50 @ 13 00
" Double Bitted........⅌ doz 21 50 @ 22 00
Underhill's........⅌ doz 12 00 @ 13 00
" Crown........⅌ doz 12 50 @ 13 50
John Leverett's........⅌ doz 12 50 @ 15 50
Ten Eyck........⅌ doz $10 50 @ 12 50 net
M. H. Jones & Co........⅌ doz 10 50 @ 11 50 net
Nobles Mfg. Co........per doz $10 50, net
Elephant........per doz $10 50 @ 11 50 net

Axle Grease.—Frazer's........⅌ ℔ 6c.
Balances.........dis 35 %
Bangs.—Plated........new list dis 50&5 %
Iron Rim........new list dis 25&5 %
Brass (Plated list)........new list dis 50, 10&5 %
Oreide........new list dis 50&5 %

Bells.
Hand, Light Brass........dis 70&10 %
" Extra Heavy........dis 40&10 %
" White Metal........dis 50&10 %
" Silver Chime........dis 20&10 %
" Swiss........dis 25 %
" Globe (Cone's Patent)........dis 20&10 %
Gong, Abbe's........dis 20&10 %
" Yankee........dis 35&10 %
" Barton's........dis 35 %
Crank, Taylor's........dis 25 %
" Brook's........dis 50 %
" Cone's........dis 10 %
" Connel's........dis 50&10 %
Lever, Sargent's........dis 60&10&10 %
" Taylor's........dis 25 %
" Hart, Bliven & Mead Mfg. Co........dis 50&10 %
Full, " " "........dis 50&10 %
" Brook's........dis 50 %
" Western........dis 25 %
Call........dis 15 %
Cow—Common Wrought........dis 20&10 %
" Western........dis 20&10 %
" " Sargent's........dis 50&10&10 %
" Kentucky "Star"........dis 20&10 %
" " Sargent's........dis 50&10&10 %
" Dodge's Genuine Kentucky, new list—

Nos.	0	1	1½	2	3	4	5	6	Hog.	
	$12·00	10·00	9·00	8·00	6·00	5·00	3·50	2·50	5·00	dis 45 %

" Yale's Genuine........dis 35 %
" Texas........dis 35 @ 40 %

Bellows.
Blacksmiths', Common, List of Sept. 15........dis 15 %
" Extra and Pittsburgh Pattern........List net
Moulders'........dis 20 %
Hand Bellows........dis 10 %

Blind Adjusters.—Domestic........⅌ doz $3—dis 20 %

Blind Fasteners.
Mickrell's........dis 30 %
Van Sand's, No. 2000, $14·00; No. 2706, $10·50.net @ dis 5 %
Washburn's Patent........⅌ gross $14 00 dis 5 %
Merriman's........new list net

Blind Staples.
Boardman's Patent, ⅜ in. and larger........⅌ ℔ 37 c
" " ⅝ in........" 42 c

Blocks.
Differential Pulley Blocks........dis 25 %
Tackle, Rope and Iron Strapped, Providence Tool Co.'s list........dis 30 %
Burr's........dis 10 %
Stanley Rule and Level Co........dis 25&10 %

Bolts.
Cast Iron Barrel, Shutter, &c........dis 60&10 %
Cast Iron Chain........dis 60&10&10 %
Wrought Iron Barrel........dis 50, 10&10 %
" " Square........dis 50, 10&10 %
" " Shutter........dis 60&10 %
Wrought Iron Flush, Stanley's........dis 15&10 %
" " " Sargent's........dis 50&10&10 %
Carriage and Tire, Common........dis 75 %
" " " Norway Iron........dis 50&10 %
" " " R. B. & W........(old list) dis 65 %
" " " Philadelphia........dis 60&5 %
" " " Shelton's........(old list) dis 60&10 %
Union Nut Company, old list........dis 65&5 %
Stove........dis 25 %
" R. B. & W........dis 30 %
" Shelton's Shaved Head........dis 25 %

Borax.........15c. ⅌ ℔

Boring Machines.

	Upright.	Angular.
Bovey's, no Augers	$3·15	$4·00 net
" with Augers	5·00	6·00 net
Douglass', no Augers	3·25	4·00 net
" with Augers	5·00	6·00 net
Parr's, no Augers	5·00	7·50 dis 30 %
" with Augers	7·50	10·00 dis 30 %
Kellogg's, no Augers	5·25	6·75 dis 15 %
Sweets	3·25	4·00 net
" with Augers	5·00	6·00 net
Snell's	4·75	6·25 dis 20 %
Phillips', with Augers		10·00 dis 25 %

Mortising Machines, $20·00 each........dis 20 %

Bow Pins.
Union Nut Co........new list dis 50&10&5 %
Hotchkiss'........dis 50 @ 55 %
Humason, Beckley & Co.'s........dis 50&10&5 %
Sargent & Co.'s........dis 50&10&10 %

Braces.
Barber's Patent........dis 40&5 %
Q. S. Backus........dis 40&10 %
Wilson Mfg. Co........dis 10 %
Spofford's Patent........dis 50 %
Noble's Patent........dis 40&5 %
Ives' Novelty........dis 40&7½&10 %
" Camden........dis 15&10 %
Common Ball (American)........dis 25 %

Brackets.—Shelf........dis 60&10 @ 65&10 %
Bright Wire Goods.........dis 65&10&10 %
Bull Rings.—Union Nut Co........dis 50&20 %
Sargent's........dis 60&10 %
Hotchkiss'........2½ in., $2·25 net

Bung Hole Borers.
Corning and King........dis 20&10 %
Ives' Tap Borers........dis 10&10 @ 25 %
Enterprise Mfg. Co........dis 20 %

Butchers' Cleavers.
Humason & Beckley Mfg. Co........dis 20&10 %
Bradley's........dis 25 %
Beatty's........dis 20 %

2	3	4	5	6	7	8	8
$19·00	$21·00	$24·00	$27·00	$30·00	$33·50	$36·50	$40·00

Hart Mfg. Co........dis 45&10 %

0	1	2	3	4	5	6
$25·25	$29·75	$34·25	$38·75	$43·25	$48·50	$54·00

Butts.
Wrought Brass........dis 30 %
Cast Brass........dis 30 %

COMMON CAST, NOT DRILLED.
Fast Joint, Narrow........New list July........dis 30&10 %
" Broad........"........dis 40&10 %
" " Jap'd........"........dis 35&10 %
Loose Joint, Narrow and Broad........"........dis 50&10 %
" " Jap'd........"........dis 45&10 %
Parliament Butts & Mayer's Hinges........"........dis 40&10 %
Loose Pin........"........dis 45&10 %
" Japanned........"........dis 35&10 %
Loose Pin, Jap'd, Plated Tips........"........dis 50&10 %

Drilled and Wired.
Fast Joint, Narrow........New list July 1, dis 25&10 %
" Broad........"........dis 35&10 %
" Japanned........"........dis 30&10 %
Loose Joint........new list July 1, dis 45&10 %
" Japanned........"........dis 45&10 %
Parliament & Mayer's Hinges........"........dis 35&10 %
Loose Pin........"........dis 40&10 %
" Japanned........"........dis 50&10 %
" " Plated Tips........"........dis 45&10 %
Union Mfg. Co.'s Fancy Butts.—
Figured Enameled Loose Joint........dis 55&10 %
Nickel Plated "........dis 33⅓&10 %
Boston Finish, Plain........dis 80&5 %
" " with Iron Acorns........dis 75&5 %
" " with Sil'd "........dis 65&5 %

WROUGHT IRON.
Fast Joint, Narrow, Lt. and Regular........dis 30&5
" Broad........dis 35&5
Loose Joint, Broad........dis 40&5
Table Butts, Back Flaps, &c........dis 3 &5
Inside Blind, Regular........dis 20&5
" " Light........dis 40&5
Loose Pin Wrt........dis 35&5
Am. Spiral Spring Butt Co. list May 1st........dis 20 %
Union Spring Hinge Co........dis 20 %
Blind Butts, Parker........dis 65&10 %
" Palmer........dis 40 %
" Seymour........dis 60&5 %
" Shepard........dis 60 @ 60&10 %
" Lull & Porter........dis 60 %
" Nicholson........dis 45&10 %
" Hufler........dis 33⅓&10 %
" Garretson, No. 1........dis 65 %
" Clark's, Nos. 1, 3 and 5........dis 65&10 %
" Clark's No. 2........dis 70&10 %
" " Nos. 2 4. 4½, 6, 8, 10........dis 45 %

Can Openers.
Messenger's Comet........per doz $3·00 dis 20 %
American........per doz 2·25 dis 40 %
Lyman's........per doz 3·75 dis 20 %
No. 4, French........per doz 2·25 dis 40 %
No. 5, Iron Handle........per doz 2·25 dis 40 %

Sprague's........Nos.	1	2	3	4	
Per doz	$4·00	4·50	5·00	9·00	dis 55&10 %

Star........per doz $3·00 dis 20&10 %
Eureka........per doz $3·50 net
Sardine Scissors........per doz $7·00 dis 40 %

Caps—Percussion, per 1000.
G. D........37 @ 40c
Ely's E. B........1-4s, 55c.; 1-10s, 70c. gold
" Double Waterproof, 1-4s, $1·45; 1-10s, $1·52½c., gold
" Colt's........1-10s 80c gold

Carpet Sweepers.
Union........each $2 75 net
Welcome........each 2 75 net

Cartridges.—Metallic........dis 55&5 %
Cards.—Horse and Curry........dis 30&10 %
Cotton........dis 10&10 %
Wool........dis 15&10 %

Carpet Stretchers.
Cast Steel, Polished........per doz $5·00 dis 30 %
Cast Iron, Steel Points........per doz $2·00 dis 45&5 %

Casters.
Bed........dis 30&10 @ 40 %
Plate and Shallow Socket........dis 40&10 %
Deep Socket........dis 35 @ 40 %

Cattle Leaders.........new list dis 60&10 %

Chain.
English Coil........net gold

⅌ ℔	11½	8⅝	7⅜	7⅛	7¼	7c
	3-16	¼	5-16	⅜	7-16	½

Trace, 6½-10-2........by the cask, ⅌ pair, gold 56c
Trace, 7-10-2........by the cask, ⅌ pair, gold. 62c
German Halter Chain........dis 20 @ 25 % gold
German Coil........dis 20 @ 25 % gold
Galvanized Pump Chain........⅌ ℔ 13c
Jack Chain, Iron........dis 50&10 %
" Brass........dis 40&10 %

Chalk.
White........⅌ gross, 57c net
Red........⅌ gross, 90c net
Blue........⅌ gross, $1·00 net
White Crayons........⅌ gross, 16½c net

Chisels.
Socket Framing, Douglass, Extra........dis 60&10&10 %
" " Crossman........dis 50&15&10 %
" " Buck Bros. equivalent to dis 50&17½ %
" " Hart Mfg. Co........dis 60&10 %
" " Merrill........dis 60&10 %
" Firmers, Douglass, Extra........dis 60&10 %
" " Crossman........dis 50&10&10 %
" " Buck Bros........equivalent to dis 50&15 %
" " Hart Mfg. Co........dis 60&5 %
" " Merrill........dis 60 %
Socket Corner........dis 60&10 %
Tanged Firmers........dis 40&10 %
" " Butcher's........$5·50 to £ gold
" " Newbould's........$5·50 to £ gold
" " Spear & Jackson's........$5·00 to £ gold
" " Buck Bros (Shank)........$5·50 to £ gold

Clamps.
Iron, Providence Tool Co.'s........dis 20 %
" Adjustable, Gray's........dis 20 %
" " Lambert's........dis 20 %
" " Snow's........dis 40&5 %
" " Hammer's........dis 10 %
" Cabinet........dis 60&10 %
Saw Clamps........see vises

Clips, Axle.
Norway or Best........dis 30 @ 40 %
Superior........dis 50 @ 55 %

Coal Shovels.

	Nos.	1	2	
Wrought Iron.				
Long Wrt. H'dles..per gross,		$15·00	18·00	dis 25 %
Short " "	"	12·00	14·00	dis 25 %
Wood Handles	"	12·00	14·00	dis 25 %
Gem (Edgar's Pat.)	"	15·00	18·00	dis 25 @ 30 %

Cast Iron, Iron Handle........per doz, 75 @ 80c. net
" Wood Handle........per doz, $1·00 net

Coal Hods.

Inch.	14	15	16	17	18	
Regular, Jap'd...per doz,	$12·00	12·75	13·50	15·50	18·00	dis 60&10 %
Regular, Gal'd... "	15·00	16·00	17·50	19·50	22·50	dis 50&10 %
Ladies' Favorite, Jap'd. ⅌ doz	15·00	16·00	18·00	20·00		dis 50 %
Ladies' Favorite, Galvanized..... "	19·00	20·00	22·00	25·00		dis 45 %

Funnel Hods.—	Nos.	15	16	17	
Oriental, Japanned	⅌ doz.	$16·50	18·00	20·00	dis 50 %
" Galvanized	"	21·50	22·50	24·00	dis 40 %
Morning Glory, Jap'd.	"	16·50	18·00	20·00	dis 50 %
" Gal'd.	"	21·00	22·50	24·00	dis 40 %
Iron Clad, Jap'd	"		21·50		dis 60&10 %
" " Gal'd	"		22·50		dis 50&10 %

Sidney Shepard & Co.'s new list........dis 10 %

Cockeyes.—1¼ in., 28c.; 1½ in., 33c.; 1¾ in., 37c. net

Cocks.
Brass Racking........dis 40 %
Lock and Globe........dis 40 %
Lever Bibbs........dis 40 %
Ale and Beer........dis 45&10 %

Coffee Mills.
Board and Box........dis 15 @ 20 %
Brighton........dis 20 %
Increase Wilson's........dis 20 %
Selsor's Pat........$9·50, $10·50—dis 25 %
American (Enterprise Mfg. Co.)........dis 20 %
French Steel........dis 20 %
The Swift........dis 20 %

Compasses and Dividers.
Bemis & Call Co.'s........dis 35&10 %
Cook's........dis 15 %
Excelsior........dis 40 %
Peck Stow & Wilcox........dis 25 %
Miller's Patent........dis 25&10 %

Coopers' Tools.
Bradley's........dis 15 @ 20 %
Chas. E. Little........dis 20 @ 25 %
Swan & Brombacher........dis 15 @ 20 %

Corkscrews.........dis 25 %
Corn Knives and Cutters.
Bradley's........dis 10 %

Crow Bars.
Cast Steel........⅌ ℔ 11c. net
Iron, steel points........⅌ ℔ 5c

Crucibles.—Gautier & Co........⅌ No. 5¼c

Curling Irons, &c.
⅜, ⅝, ¾ in., $1·80, $2·00, $2·40........dis 10 %
Curling Tongs........⅌ doz $6 50—dis 15 %
Pinching Irons........⅌ doz 7 50—dis 20 %

Curry Combs.
Hotchkiss' & Kellogg's, Iron & Brass, old list........dis 40 %
Fitch's (List of No. 200, $1)........dis 30 %
Rubber........⅌ doz, $9·00—dis 15 %
Wood Tooth (Fuller Bros.)........per doz $2·25 net

Curtain Pins.—Silvered Glass........new list dis 15 %

Cutlery.
American Table, American Pocket { Meriden Cutlery Co } New list Jan. '76, dis 25 %; dis 25 %
Am. Pocket—Humason & Beckley Mfg. Co........dis 20&10 %
Am. Miller Bro.'s Cutlery Co........dis 25 %
Naugatuck Cutlery Co........dis 25 %

Dippers.
Britannia........per doz 7·50—dis 30 %; by bbl. dis 33⅓ %
Cocoa, Plain........per doz $8·25—dis 30 %
" Rimmed........per doz 3·75—dis 20 %

Dog Collars.
Embossed Gilt........dis 20 %
Leather........dis 30 %
Brass........dis 25 %

Door Springs.
Gem (V.W.&W.). No. 1 Large, Jap'd ..⅌ doz $3·50; No. 2 Medium ⅌ doz 2·50; No. 3 Small ⅌ doz 2·00........dis 10 %
Gray's (V.W.&W.)........⅌ doz 2·50 net
Torrey's Pattern (V.W.&W.)........⅌ doz $2·50 net
Torrey's Patent........⅌ doz $2·50 net
Johnson's........per doz $3 00 net
Philadelphia........5 in., $5·00 8 in., $7·00 dis 15 %
Palmer's Japanned No. 6........⅌ doz $5·00; Coppered " 6·00; Silvered " 8·00........dis 20 %

Challenge—	Nos.	9	7	6	
Japanned	per doz	$2·00	2·50	3·50	dis 10 %
Coppered	per doz	4·00	4·50	5·00	
Galvanized	per doz	3·50	4·00	4·50	
Nickeled	per doz	5·50	6·00	7·00	

Barker's Concealed........dis 15 %

Drawing Knives.
Crossman's No. 1........dis 50&15&10 %
Douglass, Extra........dis 60&10&10 %
Hart Mfg. Co., No. 1........dis 60 %
Merrill........dis 60&10 %
Nobles Mfg. Co........dis 15 %
Bradley's........dis 25 %
Adjustable Handle........dis 15 %

Drills and Drill Stocks.
Blacksmiths'........each $2 60 net
" Self-Feeding........each $8 00 net
Breast, P. S. & W........dis 45 %
" Aiken's........dis 25&10 %
" Hotchkiss........dis 10 %
" Wilson's........dis 10 %
" Miller's Falls........dis 25 %
Ratchet, Merrill's........dis 20 %
" Ingersoll's (old list)........dis 35 %
" Whitney's........dis 20 %
Ratchet, Weston's........dis 0 %
" Moore's Triple Action........dis 20 @ 25 %
Wilson's Drill Stocks........dis 10 %
Automatic Boring Tools........each $2·75—dis 20 %

Drill Chucks.
Danbury........each 10·00, dis 30 @ 35 %
Morse's Beach Patent........dis 30 %
" Adjustable........each $10·00, dis 30 %

Egg Beaters.
Monroe's........8 in. 10 in. Per doz $8·00 9·00........dis 10 %
Dover........⅌ doz $6·00—dis 10 %
National........⅌ doz $4·50—dis 20 %
Peerless........⅌ doz $7·00—net

Emery.
Genuine Chester—Regular Nos........⅌ ℔ 6c; Flour and FF........⅌ ℔ 4c........dis 10 %
Washington Mills—Regular Nos........⅌ ℔ 8c
" Flour........⅌ ℔ 5c
Wellington Mills, Grain........⅌ ℔ 10c. net
" " Flour........⅌ ℔ 8c. net

Enameled and Tinned Ware.
Kettles........dis 30 @ 40 %
Sauce Pans........dis 25 %
Glue Kettles........dis 25 %
Tinned Saucepans........dis 25 %

Escutcheons.
Door Lock........Same discounts as Door Locks
Brass Thread........dis 60&10 %
Wood........dis 25 %

Faucets.
Fenn's........dis 50 %
" Cork Stops........dis 40 %
Star........dis 55&10 %
Frary's Patent Petroleum........dis 15&10 %
Taylor's Pattern "........dis 20&10 %
Wood and Metallic........dis 40 %
Wood, Cork Lined........dis 65 @ 65&5 %
Enterprise Mfg. Co., Self-Measuring........dis 20 %

Felloe Plates.........⅌ ℔ 15c; dis 25&10 %

Files.
American File Co........$5 00 to £ currency—dis 20 %
Arcade File Works........$5·00 to £ currency
Auburn File Works........$5 00 to £ currency
Nicholson........new list, Jan. 1, 1875, net @ 5 %
Hartford File Co........$5 50 to £ currency—dis 10 %
L. B. Heller & Co........$5 00 to £ currency
Heller & Bros........$5 00 to £ currency
"Western"........5 00 to £ net
Wheeler, Clemson & Co........$5 00 to £ currency
Rothery's........$5 to £ currency
J. & Riley Carr........5 25 to £ gold
" Horse Rasps........5 50 to £ gold
Stubs'........5 50 @ 9 00 to £ gold
Butcher's........5 25 to £ gold
Walter Spencer & Co.'s "Diamond"........5 00 to £ gold
Spear & Jackson's........5 00 to £ gold
Jowitt's........4 50 to £ gold
Newbould's........5 25 to £ gold
W. K. & C. Peace's "Imperial"........5 25 to £ gold
R. Ibbotson........5 00 to £ gold
Turton Bros. & Matthews........$5 50 to £ currency
Fisher's........4 75 to £ gold
Goodlad's........4 00 to £ gold
Moss & Gamble........5 25 @ 5 50 to £ gold
Thos. Turner & Co. (Peter A. Frasse & Co.)........5 00 to £ gold
" Horse Rasps........5 25 to £ gold
"Philo Sheffield," P. T. Co........5 00 to £ gold
Limet & Co. (French)........4 25 to £ gold

Fluting Machines.
Mrs. Coles' Pony..4 in., $4·75; 5 in., $5; 6 in., $5·50; 7 in., $6
Knox with 4-inch Rolls........3 80 each net
" " 6 "........4 30 each net
" " 8 "........6 75 each net
O. K........6 50 each net
Peerless, 4-inch Rolls........4 00 each net
" 5 "........4 75 each net
Excelsior, No. 1........4 75 each net
" No. 2........6 50 each net
Diamond........7 50 each net
Champion, 6 inch rolls........6 00 each net
" 4 inch rolls........5 00 each net
Climax 7-inch Rolls........8 00 each net
" 4½ "........6 50 each net
Empire........4 00 each net
Eureka, No. 1, 7-inch Roll........8 00 each net
" No. 2, 5-inch Roll........6 00 each net
Defiance........4 in., $3·50; 6 in., $4·00; 8 in., $6·50 each net
K. F. M., 4½-inch Roll........5 50 each dis 15 %
" 6-inch Roll........6 00 each dis 15 %
Myers' Fashion Fluter, 4½-inch Rolls........2 75 each net
" Convex Brass Fluter, Sad Iron attachment........per doz $15·00
Domestic Fluter........$1·50 each net
Geneva Hand Fluter........$15 00 per doz net

Fluting Scissors.........dis 25&10 %

Forges.
"Empire" (W. P. Kellogg & Co.)........dis 20 %

Forks.
Hay, Manure & Spading........dis 33⅓ %
Plated A 1........dis 50 %

Fry Pans.
Burnished, P. S. & W., new list........dis 50 %

⅌ doz.....	$3·00	3·75	4·25	4·75	5·25	6·00	7·00	8·00	9·00
No.	0	1	2	3	4	5	6	7	8

Gauges.
Marking........dis 45&10 %
Wire........dis 10 %
" Smith's Patent........per doz $18·00, dis 40 %

Gimlets.
Nail and Spike........dis 25&10 %
"Bee" Gimlets........per gross, $12·00, dis 25 %
Double Cut, Shepardson's........dis 20 %
" " Hartwell's........dis 40 %
" " Ives'........dis 25 %
" " Douglass'........dis 20&10 %

Glue Pots.
Tinned and Enameled........dis 25 %
Family, Howe's "Eureka"........dis 25 %
" L. E. & C.'s "Handy"........dis 25 %

Grind Stone Fixtures.
Sargent's Patent........dis 65&10 %
Reading Hardware Co........dis 70&10 %
J. F. Green & Bro........dis 20 %
Hart Mfg. Co.'s........dis 60&5&10 %
Rick Bros........dis 4·&5 %

Hammers.
Emmet Hammer Co.'s Handled........dis 25 %
" " Sledge & Stone.⅌ ℔ 40c.; dis 40 %
Humason & Beckley Mfg. Co........dis 16⅔&10 %
Maydole's........dis 12 %
Henry Hammonds' (Maydole's List)........dis 12 %
Cheney's........net @ dis 5 %
Verree........dis 5 %
Yerks & Plumb........dis 20 %
Magnetic Tack........dis 25&10 %
Warner & Noble's........dis 10 %

Hand Cuffs and Leg Irons.
Tower's Hand Cuffs, $4 00 per pair; Leg Irons $6 50 per pair........dis 25 %
Providence Tool Co.'s Hand Cuffs $15 per doz; Leg Irons 25 "........dis 10 %

Handles.
Door or Thumb Latches—

Nos.	0	1	2	3	4
Per doz	$·80	1·00	1·18	1·35	1·50—dis 60 %

Roggin's Latches........40c. @ 50c. net
Bronzed Iron Drop Latches........per doz $1·50 net
Wrought Chest........dis 60&10 %
Surface Chest........dis 65&10&10 %
Flush Chest........dis 60&10&10 %
Lifting........dis 60&10 %
Coffin........dis 50&10 @ 60&10 %
Saw and Plane........dis 25&10 %
Hammer and Hatchet........dis 10 %
N. Carolina Handle Co........dis 15 %
Brad Awl........per gross $3 50—dis 20&10 %
Hickory Firmer Chisel, ass'td........" 5 25—dis 20&10 %
" " " large........" 6 50—dis 20&10 %
Apple " " ass'td........" 6 00—dis 20&10 %
" " " large........" 7 50—dis 20&10 %
Socket " " ass'td........" 3 50—dis 20&10 %
" Framing " "........" 7 00—dis 20&10 %
File........" 4 00—dis 20&10 %
Auger........" 6 50—dis 20&10 %
" large........" 8 00—dis 20&10 %
Patent Auger, Ives'........dis 25&10 %
" " Douglass'........per set $1 25—dis 10 %
" " Swan's........per set $1 00—dis 20&10 %

Hangers.
Barn Door........dis 65&10 %
"Anti-Friction" No. 1, $1·25; No. 2, $1·50 ⅌ pr. dis 30&5 %
Novelty........dis 30 %
Challenge........dis 40 %

Harness Snaps.
Henshaw's........dis 25&10 %
Judd's........dis 40 %
Fitch's (Bristol)........dis 30 %
Hotchkiss'........dis 10 %
Andrews'........dis 25 %
Sargent's........dis 50&10 %
New York Wire........dis 20&20 %

Hatchets.—Isaiah Blood........dis 15 %
Shingling, Nos. 1 2 3........⅌ doz $7 25 8 00 8 75
Claw, " 1 2 3........⅌ doz 7 75 8 50 9 25
Lathing, " 1 2 3........⅌ doz 7 50 8 00 8 50
Hunt's........dis 15 %
Shingling, Nos. 1 2 3........⅌ doz $7 25 8 00 8 75
Claw, " 1 2 3........⅌ doz 7 75 8 50 9 25
Lathing, " 1 2 3........⅌ doz 7 50 8 25 9 00
Hurd's........dis 30 %
Shingling, Nos. 1 2 3........⅌ doz $8 00 8 50 9 00
Claw, " 1 2 3........⅌ doz 9 00 9 50 10 00
Lathing, " 1 2 3........⅌ doz 8 00 8 50 9 00
Newark's Edge Tool Co.'s........dis 25 %
Shingling, Nos. 1 2 3........⅌ doz $6 50 7 00 7 50
Claw, " 1 2 3........⅌ doz 7 25 7 75 8 25
Lathing, " 1 2 3........⅌ doz 6 50 7 00 7 50
Yerkes & Plumb........dis 20 %
Shingling, Nos. 1 2 3........⅌ doz $7 00 7 50 8 00
Claw, " 1 2 3........⅌ doz 7 50 8 00 8 50
Lathing, " 1 2 3........⅌ doz 7 00 7 50 8 00
Simmons'........dis 15 %
Shingling, Nos. 0 1 2 3....⅌ doz $7 50 8 00 8 50 9 00
Claw, " 1 2 3....⅌ doz 9 00 9 50 10 00
Lathing, " 1 2 3....⅌ doz 8 00 8 50 9 00
Broad, " 1 2 3....⅌ doz 9 00 10 00 12 00
" " 4 5 6....⅌ doz 14 00 16 00 18 00
" " 7 8....⅌ doz 20 00 22 00
Elephant........dis 30 %
Shingling, Nos. 1 2 3........⅌ doz $8 00 8 50 9 00
Claw, " 1 2 3........⅌ doz 9 00 9 50 10 00
Lathing, " 1 2 3........⅌ doz 8 00 8 50 9 00
J. P. Verree & Co........dis 5 %
Shingling, Nos. 1 2 3........⅌ doz $7 00 7 50 8 00
Claw, " 1 2 3........⅌ doz 7 50 8 00 8 50
Lathing, " 1 2 3........⅌ doz 7 00 7 50 8 00
Underhill's........dis 10 %
Shingling, Nos. 1 2 3........⅌ doz 7 25 8 00 8 75
Claw, " 1 2 3........⅌ doz 7 75 8 50 9 25
Lathing, " 1 2 3........⅌ doz 12 00 11 00 13 00
M. H. Jones & Co........dis 25 %
Shingling, Nos. 1 2 3........⅌ doz $8 00 8 50 9 00
Claw, " 1 2 3........⅌ doz 9 00 9 50 10 00
Lathing, " 1 2 3........⅌ doz 8 00 8 50 9 00

Hay Knives.—"Lightning"........per doz $20·00 net

Hinges.
Gate, Western........⅌ doz $6·25—dis 60&10 %
" N. E........⅌ doz 11 25—dis 60&10&10 %
" N. Y. State........⅌ doz 7·20—dis 60&10 %
Rolled Plate........dis 65&10 %
" Raised........dis 65&10 %
Wrought Strap and T........dis 40&5 @ 55 %
Providence Plate. { 6 and 8 in. 11c ⅌ ℔; over 8 in. 9¼c ⅌ ℔ }........dis 30 %
Screw Hook and Strap........{ 8, 10, 12 in. 6¼c; 14 to 36 in. 5¼c }....net
Heavy Welded Hook........{ 8 to 12 in., 6¼c; 14 in. & up, 6c }....net
Screw Hook and Eye........{ ⅝ to 1 in., 8¼c; ⅜ in. 9¼c; ¼ in. 11½c }....net

Hoes.
Solid Shank, C. S........⅌ doz $8 00—dis 35 %
Socket........⅌ doz 9 00—dis 35 %
Riveted Eye........⅌ doz 5 00—dis 35 %
Grub........dis 25 %
Planters........dis 15 @ 20 %
" Scovill........add 33⅓ %
" Scovill Pattern........dis 10 @ 15 %
Lane's C. S. Cresent, American Pattern........list net
" " Scovil Pattern........add 10 %

Hooks.
Bird Cage........dis 60&10 @ 70&10 %
Cotton........dis 50 %
Belt........dis 55 @ 60 %
Bench—Hotchkiss' $5 00 ⅌ doz........dis 10 %
" Weston's No. 1, $6·00; No. 2, $7·00 per doz net
" McGill's........$3 00 per doz, dis 10 %
" Skinner's........per doz $6·25, dis 20 %
Clothes Line, Harness, Wardrobe, Hat and Coat, Ceiling........Hart's list........dis 60&10&10 %; Sargent's list........dis 65&5&10 %; Reading list........dis 35&10 %
Wrought Staples and Hooks and Staples..dis 70&10 @ 75 %
Wire Screw Hooks and Eyes........dis 65&10&10 %
Grass........dis 20 %
Whiffletree—Patent........dis 33⅓ %
Hooks and Eyes—Malleable Iron........dis 60&10&10 %
" " Brass........dis 60&10&10 %

Horse Nails.

	Nos.	5	6	7	8	9	10
Ausable	⅌ ℔	30c	27c	25c	24c	23c	22c
" P't'd & Pol'd	"	31c	28c	26c	25c	24c	23c
" " & Blued	"	32c	29c	27c	26c	25c	24c
Cortland	"	29c	26c	24c	23c	22c	21c
Buffalo Forged	"	31c	28c	26c	25c	24c	23c
Globe, P't'd & Pol'd	"	31c	28c	26c	25c	24c	23c
National, Pointed and Polished, Pat. Fin	"	28c	25c	23c	22c	21c	20c
National, Pointed and Polished, Ex. Fin	"	30c	27c	25c	24c	23c	22c
Perkin's P't'd—Black	"	29c	26c	24c	23c	22c	20c
Perkins' Pointed and Polished	"	30c	27c	25c	24c	23c	21c
Perkins' Pointed and Blued	"	31c	28c	26c	25c	24c	22c
Putnam	"	32c	28c	26c	25c	24c	20c
Vulcan, P't'd & Blued.	"	31c	28c	26c	25c	24c	23c

Star Brand, 16c.; Morgan........14c
Putnam........20.0 lbs., dis 5 %
Ausable, National, Globe and New London........1000 lbs., dis 5 %
Perkins' and Vulcan........1000 lbs., dis 7½ %
Perkins' and Vulcan........500 lbs., dis 5 %

Horse Shoes.
Burden........⅌ keg, $5·12½
R. I. Horse Shoe Co., Perkins Pattern........⅌ keg, 5·12½
" " R. I. Pattern........⅌ keg, 5·87½
Mule Shoes........⅌ keg, 6·12½
Perkins' Snow........⅌ keg, 6·62½
Boston Rolling Mills Hand Made........⅌ ℔ 8c

Kettles.
Brass........⅌ ℔ 45c net
Enameled........dis 30 @ 40 %

Knives.
Ames' Butcher Knives........dis 20 %
" Shoe "........dis 15 %
" Bread "........⅌ doz $1·50—dis 15 %
Hay and Straw, "Wadsworth's"........dis 20 %
Table and Pocket........See Cutlery

Knobs.
Carriage (Jap'd 8 cents per gross)........dis 60&10 %
Base—Common........net
" Plush Tip........dis 10 %
" Elastic End, No. 8........dis 45 @ 50 %
Door, Mineral........⅌ doz $2·25; " Por. Jap'd........⅌ doz 3·00; " " Plated........⅌ doz 7·0; " " Por........⅌ doz 7·50........dis 40&5 % & 2 % for cash
Furniture, Plain........75c gross inch, dis 10 %

Ladles.
Melting, Hart's........dis 55&10 %
" Sargent's........dis 50&10 %
" Reading........dis 15&10 %
" Monroe's Patent........per doz $4·00 dis 20 %

Lanterns.
Tubular........No. 0, $11·00; No. 1, $14·00 net
Peerless........No. 5, per doz $11·75—dis 10&10 %
Brady's Patent........dis 10 & 10 %
Ætna........dis 10 & 10 %
Yankee........dis 10 & 10 %
De Beque........dis 10 & 10 %
Police, Small........per doz $7·50 net

Lard Presses.
Draw Cut, 14 inch........each $65 00—dis 20 %

Lemon Squeezers.
Porcelain Lined........per doz $7 00, dis 15 %
Eureka, Tinned........per doz, $ 0·00 dis 10 %
Dunlap's Improved........per doz $6·00 net

Lines.
Linen Fish........dis 20 %
Cotton Chalk........dis 40 @ 45 %
Sil. Lake Chalk......Nos. 0, 1, 2, 3, $6, 6·50, 7, 7·50, dis 20 %
Mason's........dis 20 %

Locks and Latches.
Cabinet—Gaylord........dis 25 %
" Eagle........dis 25 %
Trunk "........dis 25 %
Langstroth & Crane, Round Key........dis 40 %
" " Flat Key........dis 33⅓ %
Barnes & Deitz, Flat Key........dis 25 %
Yale Lock Co., Flat Key........dis 40 %
Sargent & Greenleaf, Flat Key........dis 20 %
Continental........dis 25 %
Shepardson's........dis 20 %
American Lock Co........dis 33⅓ %
Plate........new list dis 40&2 %
Trenton, Branford, Norwich, Russell & Erwin, Norwalk, Nashua, Mallory, Wheeler & Co, P. & F. Corbin, Parker & Whipple, Jacobus & Nimick Mfg. Co........dis 40&5 % ....and 2 % for cash
Padlocks, Russell & Erwin; " Mallory, Wheeler & Co; " Wm. Wilcox & Co........dis 40&5 % ...and 2 % for cash
" Romer's........dis 5 %
" Vulcan Hardware Co........dis 20 %
" New York Lock Co........dis 20 %
" J. H. McWilliams........dis 5 %
" Barnes & Deitz........dis 25 %
" D. K. Miller Lock Co........dis 30&10 %
" Penn Lock Works........dis 20 %

Mallets.—Hickory and Lignumvitæ........dis 20 %

Meat Cutters.
Dixon's (P. S. & W.).Nos. 1 2 3 4 ⅌ doz. $14 00 $17 00 $19 00 $30 00 dis 25 %
Miles Challenge......Nos 1 2 3 ⅌ doz. $22·00 $30·00 $40.00—dis 30 %
Perry's (P. S. & W.)....Nos. 200 300 400 ⅌ doz. $22·00 $27·00 $40·00—dis 25 %
Woodruff's (P. S. & W.)......Nos. 100 150 ⅌ doz. $15·00 $18·00—dis 25 %
Hales'........Nos. 11 12 13 ⅌ doz. $27·00 $33·00 $42·0—dis 35&2 %
Draw Cut........Nos. 5 6 7 Each $36·00 $90·00 $250 00—dis 20 %
American........dis 25 @ 25&5 %

No......	1	2	2½	3	4	B	5
Each	$6·00	$9·00	$12·00	$15·00	$30·00	$60·00	$75·00

Molasses Gates.
Stebbins'........dis 62½&10 %
" Tinned ends........dis 40&10 %
Bush's........dis 20 %
Lincoln's........dis 50&10 %
Weed's........dis 15 %

Mortars and Pestles.
Iron........net

Nail Pullers.
Taft's........per doz $24·00 net

Nails.........10d., $3·00 @ $3·10 net

Nuts and Washers.
Nuts........large, 7c; small, 10c off list.
Washers........large, 9c; small, 12c off list.

Oilers.
Miller's Zinc, Brass and Copper........dis 40 %
Sheet Metal Screw, Zinc, Brass and Copper........dis 40 %
Olmsted's........dis 25&10 %
Broughton's........dis 25&10 %
Malleable........per doz $5 00 dis 10 %
Prior's Patent or "Paragon"........dis 40 %

Ox Shoes.
Concave........⅌ ℔ 13c net

Ox Balls.........dis 60&10 %

Pencils.
Faber's Carpenter's........net
" Round Gilt........⅌ gross $6 60 net
Dixon's Lead........⅌ gross $4·50 net
" Lumber........⅌ gross 9·00 net

Picture Nails and Knobs.
Brass Head........dis 60&10 %
Porcelain Head........dis 55&10 %
Richards' Patent........dis 40 @ 40&10 %
Judd's........dis 60&10 %

Pinking Irons.........per doz $2 75—dis 65 %

Planes and Plane Irons.
First Quality........dis 45 %
Second Quality........dis 50 %
Bailey's Patent Adjustable........dis 25&10 %
Plane Irons, Butcher's........$5 50 to £ gold—new list
" Buck Bros........$5 50 to £ gold
Plane Irons, Bailey's Patent........dis 25&10 %
" Auburn Tool Co.'s........dis 25 %
" Greenfield Tool Co........net list
" Middletown Tool Co........net list
" Ohio Tool Co........dis 10 %
" Spear & Jackson's........5 00 to £ gold
Plane Irons, Sandusky Tool Co........dis 10 %
Plow Bits, Greenfield Tool Co........dis 10 %

Pliers and Nippers.
Button's Patent........dis 33⅓ %
Hull's Patent Nippers, No. 1, $15; No. 2, $21 ⅌ doz dis 25 %
Leach's Patent Wire Cutters........per doz $6 50—dis 15 %
Gas Pliers........dis 25 %

Plumbs and Levels.
Stanley R. & L. Co.'s Pat. Adjustable........dis 65&10 %
" " " Non-Adjustable........dis 65&10 %
Chapin's........dis 66⅔&10 %
Standard Rule Co.'s New Adjustable........dis 60&10
Standard Rule Co.'s Non-Adjustable........dis 60&10&10 %
Pocket Levels........dis 50&10 %
Johnson's Patent Adjustable........dis 60&10 %
Davis' Patent........dis 65&10 %

Pulleys.
Judd's Axle........per doz $0·75 dis 40 %
Hot House and Tackle........dis 60&10 %
Jap'd Screw........dis 60&10 %
Brass Screw........dis 60&10 %
Jap'd Side........dis 60&10 %
" Clothes Line........dis 60&10 %
Hay Fork........per doz $4 50 @ 5 00, dis 10 %

Pumps.
Douglas Cistern, etc........new list dis 25 %
" S. & F........new list dis 20 %
Union Mfg. Co's Cistern and Pitcher........dis 35 %
" " " Rams........dis 20 %
" " " Garden Engines........dis 10 %
Cucumber (Burlingham & Purdy)—
6 ft. No. 3, with 12 ft. pipe........$4·00 net
ft. No. 1, with 12 ft. pipe........4·50 net
From 6 to 36 ft. add 20 cents per ft.
Pipe, 8c. per ft.; Coupling, 20c. per ft.

Punches.
Belt or Drive........per doz $1·50 net
Spring........per doz $6·50—dis 20&10 %
" Leach's Patent........dis 15 %

Rail.
Sliding Door, Wrought Brass........⅌ ℔ 44c., dis 10 %
" " Iron, Painted........⅌ foot 9c—dis 55&10 %
Barn Door, ⅛, ⅜ and ¾ inch........dis 60&10&10 %
" " for N. E. Hangers........dis 60&10&10 %

Rakes.
Cast Steel........dis 35 %

$8 00	9 00	10 00	11 00
8	10	12	14 teeth.

Malleable........dis 85 %

$5 00	5 50	6 00	6 50
9	11	13	15 teeth.

Razor Straps.
Evan's........dis 40 %
Imitation Emerson........⅌ doz $2·75—dis 40 %
Hunt's........dis 40 %
Chapman........dis 40 %
Torrey's........dis 10 @ 15 %
Saunder's........dis 10&10 %
........net @ 10 %

Rivets.
Iron and Tinned........dis 55 %
In bulk........dis 40 %
Copper Rivets and Burrs........dis 20 %

Nos.	7	8	9	10	11	12	13	14	15
Per lb.	45c	50c	52c	54c	56c	58c	60c	65c	70c

Rivet Sets.........dis 10 %

Rods.
Stair........dis 40 %
" American Patent........dis 33⅓ %

Rollers.
Barn Door........revised list dis 60, 10&10 %
Novelty........dis 10 %

Rope. Manufacturers' List of Sept. 28, 1875.
Manila........½ inch and larger ⅌ ℔ 14½c
" ....⅜ inch ⅌ ℔ 15 c
" ....¼ and 5-16 inch ⅌ ℔ 15½c
Manila Lath Yarn and Tar'd Rope........⅌ ℔ 14 c
" Hay Rope........⅌ ℔ 15 c
Sisal........½ inch and larger ⅌ ℔ 11½c
" ....⅜ inch ⅌ ℔ 12 c
Sisal........¼ and 5-16 inch ⅌ ℔ 12½c
" Hay Rope........⅌ ℔ 12 c

Rules.

	Boxwood.	Ivory.
Chapin's	dis 60&10 %	dis 50&10 %
Stanley	dis 60&10 %	dis 50&10 %
Standard	dis 60&10 %	dis 50&10 %
Stephens'	dis 60&10 %	dis 50&10 %
Willis Thrall & Son	dis 60&10 %	dis 50&10 %

Sad Irons.
From 4 to 10 lbs........⅌ ℔ 3½ @ 3¾c net
Sad Iron, Nickel Stand attached........⅌ ℔ 9c
Self-Heating........per doz $10 00 net
" " Tailors'........per doz 22 50 net

Sand Paper.
Beader & Adamson's Flint, 00 to 1½....$4 25 ⅌ ream
" " " 2, 2½ & 3. 4 75 "
" " " Assorted. 4 25 "
" " Star........⅌ ream $3 25
" " Emery....⅌ ream $6 50 @ 11 50 ....dis 15 %
New England, same list as B. & A. Flint........dis 15 %
H. B. & M. Roman Flint " " "........dis 15 %

Sash Cord.
Common........⅌ ℔ 18 @ 20c. net
Patent........⅌ ℔ 24c. net
Silver Lake, Russia Flax........⅌ ℔ 55c
" " White Cotton........⅌ ℔ 55c
" " Drab Cotton........⅌ ℔ 60c ....net
Raw Hide........dis 15 %

Sash Locks.
Clark's, Nos. 1 and 2, $10·00 per gross........dis 33⅓ %
Ferguson's........dis 33⅓ %
Norwich........dis 25 %
Walker's........dis 10 %
New England........dis 20 %

Sash Weights.—Solid Eyes........⅌ ℔ 2c

Sausage Stuffers or Fillers.
Miles........⅌ doz $30—dis 30 %
Stow or Perry........⅌ doz No. 1, $15; No. 0, $21—dis 25 %
Draw Cut No. 4........each $30 00—dis 20 %

Saw Frames........per gross $18 00—dis 15&10 %
Saw Rods........$10 list, dis 10&10 %

Saws.
Spear & Jackson's........$3 50 to £ gold
Am. Saw Co........new list
Perforated Cross Cuts, all kinds........68c ⅌ foot
Inserted Tooth........dis 10 %
All else........dis 12½ %
Disston's Circular........dis 25 %
" Mill........dis 25 %
" Cross Cut........dis 15 %
" Hand, Panel, Rip, &c........dis 15 %
H. W. Peace's Circulars........dis 25 %
" Other kinds........dis 20 %
Wm. McNiece's Hand, Cross Cut and Circular........new list dis 15 %
Wm. McNeice's Patent Pole Pruning Saw........dis 10 %
" " Compass Saw........net.
E. M. Boynton's Lightning........dis 50 %
" " One-Man, all lengths........dis 40&5 %
" " Buck Saws (Cross Bar)........per doz $8·50
" " Billet Webs........per doz 6·00
Wheeler & Clemson Mfg. Co.'s Hand........dis 15 %
" " " Cross-Cut........dis 30 %
Livingston's Butcher and Kitchen........dis 15 %
Livingston's Framed Wood—

Nos.	101	102	103	104	105	106	
Per doz	$12·00	10·00	12·00	9·00	8·00	6·00	dis 10 %

Saw Sets.
Stillman's Genuine........⅌ doz $5·00—dis 10 %
" Imitation........⅌ doz 3·25—dis 20 %
Common Lever........per doz $2·00 dis 20 %
Leach's........No. 0, $8·00; No. 1, $15·00 dis 15 %
Nash's........No. 1, $8·50; No. 2, $5·50 dis 20&10 %
Hammer, Hotchkiss........$5·50 dis 10 %
" Bemis & Call's........dis 20 %
" Aiken's Genuine........$14·00 dis 40 %
" " Imitation........$7·00 dis 25&10 %
Boynton's........per doz $12·00 dis 30 %

Scales.
Hatch, Counter........⅌ doz $36—dis 25 %
" Tea........⅌ doz $15—dis 25 @ 30 %
Union Platform........$6·00, $7·00—dis 40 %
Turnbull's........dis 15 @ 20 %
Brown's........dis 25&5 %
Fairbanks'........new list dis 15 @ 20 %
Howe's........dis 15&5 %
Chatillon's Grocers'........dis 25 %
" Eureka........dis 20 %
Universal Family........dis 25 %
Scale Beams.
No. 1 300 to 1200 lbs........90c ⅌ cwt
No. 2 " "........75c ⅌ cwt ....dis..35 @ 40 %

Scrapers.
Box, 1 Handle........per doz $5·00, dis 10 %
" 2 "........per doz 6·00, dis 10 %
Foot........dis 60 & 10 %
Ship (common)........per doz $8 00 net
Ship—Providence Tool Co........dis 10 %

Screw Drivers.
Hart, Bliven & Mead........dis 55&10 %
Douglass Mfg. Co........dis 25&10 %
" " No. 1........dis 20&10 %
Disston's........dis 45 %

Screws.
Flat Head Iron, List of September 1, 1875........dis 40 %
Round Head Iron " " "........dis 30 %
Flat Head Brass " " "........dis 40 %
Round Head Brass " " "........dis 30 %
Brass and Silver Capped, List March 1, '75........dis 40 %
Hand Rail........dis 55&10 %
Coach or Lag........dis 30&10 @ 40 %
Coach, Patent Gimlet Point, List Jan. 1, 1875........dis 35 %
Bed........list net
Japanned, List of Plain Screws of Sept. 1, 1875........dis 15 %
Machine—Flat Head, Iron, List Jan. 12, 1875........dis 25 %
" " " Brass........dis 15 %
" Round Head, Iron........dis 20 %
" " " Brass........dis 10 %
English, Flat Head, Iron; American List, Sept. 1, 1875
Nettlefold & Chamberlain's........dis 40&7½ %
Birmingham Sc'w Co........dis 40&10 %
Birmingham Screw Co., Brass........dis 40&7½ %
Bench—Iron........dis 60, 10&10 %
" —Wood, Beech........⅌ doz $3·00 net
" " Hickory........dis 20&10 %
Hand........dis 25&10 %
Jack—Bell Bottom........dis 15 %

Scythes.
Blood's German Steel, Grass....⅌ doz $10 00
" Cast " "........⅌ doz 11 00
" Silver " "........⅌ doz 12 00
" German " Grain....⅌ doz 14 00
" Cast " "........⅌ doz 15 00
" Excelsior and Granger.⅌ doz 11 00
" Young America........10 50
" Silver Clipper........13 00 ....dis $1·50 from list
Scythe Snaths........dis 20 %

Sieves.—Mann's Patent..........dis 30 @ 35 %

	14	16	18	20	24	30 mesn
Iron...	$4·00	4·00	4·25	4·50	4·75	6 50 ℔ doz
Plated.	4·75	5·00	5·25	5·50	5·75	8·50 "

Wood Rims......18 mesh, small, $1·50 per doz, dis 10 %
" " ...... " Regular, 1·50 per doz, dis 10 %

Shears and Scissors.
Cast Steel..........dis 75&10 %
Cast Iron..........New l'st July 15..........dis 30 %
Heinisch Sons' Trimmers and Scissors..........dis 65 %
" " Standard quality Shears and Trimmers..........dis 40 %
Seymour's Straight Trimmers..........dis 60&10 %
" Scissors..........dis 50 %
Pruning..........per doz $10 00—dis 35 %
Barnard's Lamp Trimmers..........per doz $3·75

Sheaves.
Sliding Door, M. W. & Co. list..........dis 40&5&2 %
" R. & E. list..........dis 50&5&2 %
" Patent Roller..........dis 25 %
" " " Hatfield's..........dis 30 %
" Russell's Anti-Friction..........dis 50&2 %
Sliding Shutter, R & E. List..........dis 30&5&2 %

Shovels and Spades.
Ames..........dis 20 %
Birmingham Shovel Co..........dis 15 %
Rowland's..........dis 25 %
Old Colony..........new list dis 10&5 %
Middleboro' Shovel Co..........new list dis 20 %
C. E. Jennings & Co..........New list dis 30&10 %
Dunning's Shovels and Scoops..........dis 20&7½ %

Shovels and Tongs.
Iron and Brass Head, R. & E. list..........dis 50&10&2 %
" " Hart's..........dis 55&2&10 %
Polished Steel..........dis 50&10&2 %

Skates.
Barney & Berry's
N. Y. Club..........℔ pair $2·75 } dis 25 %
B. & B. Club.......... " 3·50
All Clamp.......... " 4·25
Rink.......... " 8·00
Florence Steel..........$1·00 dis 25 %
" Spring..........8·00 dis 30 %
" All Clamp..........3·50 dis 30 %
Peck & Snyder's—
No. 1, Blued..........per pair $5·00 } dis...25 %
No. 2, Nickel Plated..........per pair 6·00
No. 3, " " extra..per pair 8·00
Clipper Club Blued..........per pair 3·50
" " Full Pol'd....per pair 4·50
" " " and Nickel Plated..........per pair 6·00
Acme Club Skates.—Nos. 5 7 10 12 14
Pair $4·00 5·00 7·00 7·30 8·00 dis 20 %

Slates.
Square Frames, Round Cornered, by case..........dis 65&10 %
Less than a case..........dis 65 %

Spoke Shaves.
Iron..........dis 33⅓&10 %
Wood..........dis 30 %
Bailey's..........dis 20&10 %

Spoke Shave Irons.
Spear & Jackson's..........$5·00 to £ gold

Spoons.
Tinned Iron..........dis 10 %
By the case..........dis 20 %
Basting..........dis 10 %
Britannia..........dis 50&5 @ 55 %
" Boardman's, new list..........dis 55 %
Rogers & Bro., A 1..........dis 50 %
Derby Silver Co..........dis 50 & 5 %
Holmes, Booth & Haydens..........dis 50 %
Nickel Silver Co..........dis 40 %
German Silver..........dis 30 @ 33⅓ %
Tin (P. S. & W.)—
Teas..........$1·50 ℔ gross, net
Tables..........2·75 " net

Stocks and Dies..........dis 5&10 %

Stone.
Hindostan Stone..........℔ ℔ 6c } dis 20&10 %
" Axe Stone..........℔ ℔ 8c
" Slips..........℔ ℔ 10c
Sand Stone..........℔ ℔ 6c—dis 20&10 %
Washita Stone..........No. 1, ℔ ℔ 30c net
"..........No. 2, ℔ ℔ 25c net
" Slips..........No. 1, ℔ ℔ 60c net
Arkansas Stone..........No. 1, ℔ ℔ $1·35 net
" Slips..........No. 1, ℔ ℔ $2·50 net
Grindstones, Family, J. F. Green & Bro..........dis 20 %
" " Loring's..........dis 10 %

Stove Polish.
Joseph Dixon's..........℔ gross, 6 00
Gem..........℔ gross $4·25 @ 4·50 net
Gold Medal..........℔ gross $6 00 dis 25 %
Rising Sun..........per gross $5·75 net

Squares.
Steel..........dis 50 %; full cases, dis 50&10 %
Iron..........dis 50 %; full cases, dis 50&10 %
Nickel Plated..........add $2 50 @ $4 00 ℔ doz net
Try Squares and T Bevels..........dis 45&10 %
Star Try Squares and Bevels..........dis 30 %
Disston's Try Squares No. 1..........dis 30 %
" " No. 2..........dis 45 %
" " Improved, Nos. 1 & 2..........dis 30 %

Tacks, Brads, &c.—List of January 1, 1876.
Tacks, Half Weight, American..........dis 75&10 %
" Full " "..........dis 50&10 %
" Half " Swedes..........dis 65&10 %
" Full " "..........dis 30&10 %
" Carpet, Am. and Swedes..........dis 10&10 %
" " Leather Head..........dis 10&10 %
" Copper..........℔ ℔ 45c. dis 10 %
Brads, Half Weight..........dis 50&10 %
Shoe Nails—
4-8ths and longer, 9c.; 3½-8ths, 9½c. ℔ ℔, dis 10 %
Trunk, Clout and Finishing Nails—
⅛ ⅜ ⅝ ⅞ 1 1⅛ in. and over.
25 21 17 15 13 11c. ℔ ℔. dis 10 %
Double Pointed Tacks..........dis 33⅓&10 %

Tapes, Measuring.
American Flask and Cap Co..........dis 20 %
Eddy's..........dis 20 %

Tea Trays.
American Tea Tray Co..........dis 15 %

Thermometers.
Tin Case..........dis 50&10 %

Toe Calks.
Winsted..........℔ ℔ 13c., dis 10 %

Tobacco Cutters.
Enterprise Mfg. Co. (Champion)..........dis 20 %
Wood Bottom..........per doz $12—dis 25&10 %
All Iron..........per doz $10·50—dis 25&10 %

Tinners' Tools and Machines.
P. S. & W..........dis 10 %

Traps.
Game, Newhouse..........dis 25 %
" Peck, Stow & Wilcox..........dis 30 %
" Hotchkiss.......old list dis 30 %; new list dis 10 %
" Blake's Patent..........dis 30 %
Mouse, Wood Choker..........℔ doz holes. 15 @ 16c
" Patent Choker (Union Nut Co.)..........℔ doz holes 16 @ 18c net
" Round, Wire..........℔ doz $1 50 to 2 00 net
" Square, "..........℔ doz 2 00 to 2 50 net
" Cage. "..........℔ doz 2 50, dis 10 %
" Patent Self Setting..........per doz holes 25c net

Trowels.
Lothrop's Brick and Plastering..........dis 10 %
Disston's Brick and Plastering..........dis 12½ %
Rose's Brick..........dis 5 %
Brades' Brick..........gold, dis 10 %
Worrall's Brick and Plastering..........dis 20 %
Garden..........dis 25 %

Triers.
Butter and Cheese..........dis 25 %

Ventilators (Window).
Nickel and Gilt..........per dozen $16·00 @ 18·00

Vises.
Solid Box, Trenton...40 to 160 lbs., 16c.; 160 and over, 20c
" " Wilson's..........30 to 160 lbs., 18c } dis 25 %
160 and over, 22c
" " Peter Wrights..........16c gold
Parallel, Parker's..........dis 20 %
" Wilson's..........dis 3&10 %
" Sargent's..........dis 55&10 %
" Trenton..........dis 15 %
" Backus and Union..........dis 25 %
" Merrill's..........dis 15 %
" Fisher & Norris..........dis 15&10 %
" Buffalo..........dis 25 %
" Stevens'..........dis 15 @ 20 %
Saw Filers, Bonney's..........per doz $20·00 dis 20 %
" Stearn's..........per doz $20·00 dis 20 %
" Hopkins'..........per doz $17·50 dis 10 %

Wheel Barrows.
Canal (Pugsley & Chapman)..........new list dis 15 %
Coal, Garden and Stone (Pugsley & Chapman)..........dis 25 %

Well Wheels.
Revised list..........dis 60&10 %

Wire.
Brass and Copper..........List of Oct. 27, 1875, net
Bright and Annealed..........Nos. 0 @ 18 dis 45 @ 50 %
" " .... 19 @ 26 dis 50 @ 55 %
" " .... 27 @ 36 dis 55 @ 60 %
Coppered.......... " 0 @ 18 dis 40 @ 45 %
Galvanized, Nos. 0 to 9..........℔ ℔ 8 @ 8½c net
Galvanized, Nos. 10 to 18..........market list dis 15 @ 20 %
Tinned..........dis 25 @ 30 %
Cast Steel..........dis 15 @ 20 %
Tinned Broom Wire..........dis 35 @ 40 %
Galvanized Telegraph, Nos. 8 and 9..........℔ ℔ 9c
Galvanized Telegraph, Nos. 10 and 11..........℔ ℔ 10c
" " " 12..........℔ ℔ 10½c
Annealed Fence, Nos. 8 and 9..........dis 50 %
" Grape, " 10 to 14..........dis 50 %
Fence Staples..........℔ ℔ 7½ @ 8c
Stubs' Steel Wire..........$7 00 to £ gold
Judd's Picture Wire..........dis 50 %
Clothes Line Wire..........per coil 60c. net

Wrenches.
American Adjustable..........dis 45 %
Baxter's Adjustable "S"..........dis 20 %
" Diagonal..........dis 20 %
Collins & Co.'s..........dis 45 %
Coes' Genuine..........dis 40&10 %
" Pattern (Wrought)..........dis 50&10 %
" " (Malleable)..........dis 65&10 %
Diamond Hardware Co..........dis 40 %
Lindsay's Patent..........dis 25 %
Taft's Pattern..........dis 70&10 %
Davis Patent Duplex..........new list dis 25 %
Bemis & Call's Patent Combination..........dis 20&5 %
" " Merrick's Pattern..........dis 25&2½ %
" " Brigg's Patent..........dis 15&10 %
Aiken's Pocket (Bright)......per doz $10·00—dis 50&10 %

Wringers.

		Less than 2 doz	2 doz lots
Providence	℔ doz	$72·00	$70·00
Reliance	℔ doz	69·00	67·00
Universal—Extra	℔ doz	72·00	70·00
Novelty	℔ doz	72·00	70·00
Sherman	℔ doz	72·00	70·00
Eureka	℔ doz	60·00	58·00
Wringers without Cog Wheel	℔ doz	60·00	58·00

Stamped Tin Ware.
Common Stamped Ware..........dis 10 %
Stamped Deep and Retinned Ware..........dis 20&10 %
Japanned Tin Ware..........dis 5 %
Planished Tin Ware..........dis 20 %

METALS.

IRON.—DUTY Bars, 1 to 1¼ cents per lb., Sheet, Band, Hoop and Scroll, 1½ to 1¾ cents per lb. Provided, that none of the above Iron shall pay a less rate of duty than 35 per cent. Pig, $7 per ton; Polished Sheets, 3 cents per lb.; Wrought Scrap, $8 per ton; Cast Scrap, $6 per ton. Railroad, 70 cents per 100 lbs. Boiler and Plate, 1½ cents per lb.

Pig Iron—AMERICAN.
Foundry No. 1..........℔ ton, $23 00 @
Foundry No. 2.......... " 21 00 @
Gray Forge.......... " 19 00 @ 20 00
SCOTCH.
Coltness.......... " 32 00
Glengarnock.......... " 31 00
Gartsherrie.......... " 32 50
Eglinton.......... " 29 50 @ 30 00
Summerlee.......... "

Bar Iron.
Am. Refined, at mill..........2·4c.

Rails.
American, at works, currency..........℔ ton 42 00 @ 46 00
Old Rails.......... " 22 50

Scrap.
Wrought Scrap.......... " 20 00

Bar Iron from Store.
Common Iron.
⅜ to 2 in. round and square.... } ℔ ton $57
to 6 in. x ⅜ to 1 in..........
Refined Iron.
⅜ to 2 in. round and square.... } " 57 50 @ 60 00
1 to 6 in. x ⅜ to 1 in..........
1 to 6 in. x ¼ and 5-16.......... " 62 50 @ 65 00
Shafting Iron—2½ to 4 in.......... " 62 50 @ 75 50
Rods—3-16 to ⅜ round and square.. " 110 00 @ 65 00
Bands.......... " 70 00 @ 72 50
Hoops—⅜ to 2 in.......... " 130 00 @ 80 00
Swedish Iron.
Ordinary sizes.......... " 130 00 @ 132 50
Plow size.......... "

Sheet Iron.

		Common American and English.	R. G. American.	R. G. English.
Nos. 10 to 20	℔ ℔	3¾ @ 4c	5c	5½c
21 to 24	"	4c	5¼c	5½c
25 to 26	"	4¼c	5½c	5¾c
27	"	4¼c	5¾c	6c
28	"	4¾c	6c	6½c

Galvanized, 14 to 20, prime, ℔ ℔ 8½c; 2d quality ℔ ℔ 7½c
" 21 to 24 " " 9½c " ... " 8½c
" 25 to 26 " " 10 c " ... " 9 c
" 27 " " 10¾c " ... " 9¾c
" 28 " " 11½c " ... " 10½c
Patent Polished..........℔ ℔ 14c
Russia, Nos. 8 to 16.......... " 15½c
" Stained, No. 1.......... " 14½c
Belgian.......... 10c
One piece Corrugated Sheet Iron Elbows.

CHARCOAL IRON.
4 5 5½ 6 7 inch.
$2·50 3·50 4·50 5·25 6·50 per doz.

RUSSIA IRON.
4½ 5 5½ 6 7 inch.
$5·00 7 00 9·50 12·00 14·00 per doz.

COPPER—DUTY. Pig, Bar and Ingot, 5c.; old copper, 4 cents ℔ ℔; Manufactured (including all articles of which copper is a component of chief value) 45 % ad valorem.
American Ingot..........℔ ℔ 23¼ @ 23½c
English " ....

SHEATHING, BRAZIERS COPPER, BOLTS, &C.
Braziers Copper, ordinary sizes, over 16 oz., per square foot..........31c ℔ ℔
Braziers Copper, ordinary sizes, 16 oz. and over 12 oz., per square foot..........33c. "
Braziers' Copper, 12 oz. per square foot..........35c. "
Circles less than 84 inch in diameter..........34c ℔ ℔
Circles, 84 inch diameter and over..........37c. "
Segment and Pattern Sheets..........34c. "
Locomotive Fire Box Sheets..........31c. ℔ ℔
Sheathing Copper, over 12 oz. per sq. ft..........30c. "
" 12 oz. ℔ sq. ft. and lighter...35c. "
Bolt Copper..........31c. "
Copper Bottoms, 33c. ℔ ℔..........net
No Copper is Sheathing except 14x48 inches, and not to exceed 34 oz. to the square foot.

O'NEILL'S PATENT PLANISHED COPPER.
14x48.
14 and 16 oz. and heavier.......37c. By the case, 36c. ℔ ℔
12 oz. and lighter..........40c. " " 39c. "
Boiler Sizes.
7 in., 14x52. 8 in., 14x56. 9 in., 14x60
14 and 16 oz. and heavier.......39c. By the case, 38c. ℔ ℔
(And all sizes not over 20 inches wide.)
30x60
14 and 16 oz. and heavier..........41c. ℔ ℔
12 oz..........44c. "

TINNING.
14x48, by the case..........8c. ℔ sheet
14x48, less than case..........10c. "
Other sizes not larger than 30x60..........2½c. ℔ sq.
Larger than 30x60..........5c. "

Brass
Brown & Sharp's Gauge the Standard except for Fine Wire.

BRASS MANUFACTURERS' PRICE LIST.
October 27th, 1875.
Net cash prices for Roll and Sheet Brass, Wire, &c., for quantities of 100 pounds and over at one time. For less than 100 pounds, three cents additional.

HIGH BRASS
All Nos. to No. 28, and widths 14 in. and under..........27c
All Nos. to No. 28, inclusive, and widths over 14 to 20 in., inclusive..........30c
Over 20 in. to 30 in., inclusive..........33c
½c. ℔ ℔ advance on each No. above Nos. 28 to 38, inclusive.
All Brass thinner than No. 38 is Platers' Brass, at.....45c
Sheets 24x48 in. and all sheets cut to particular sizes and lengths..........33c
Printers' Rules..........40c
Sheets wider than 30 in. and under 40 in..........40c
" " " 40 in. and over..........42c
Circular sheets, in diam. from 4 in. to 14 inclusive....37c
" " " over 14 " 20, "....40c
" " " " 20 " 30, "....43c
" " " " 30 " 40, "....46c
" " 40 in..........49c

LOW BRASS.
Four cents ℔ ℔ more than High Brass.
Gilding Metal, 7c. ℔ ℔ more than High Brass.
Platers' or Gold Metal { In Bars..........42c / Sawed..........43c / Planed or Polished..........48c

FOR SLITTING.
Metal, in width 2 in. to ⅛ in. to No. 30, inclusive, 1c. per ℔. advance.
Metal, in width 2 in. to 1 in., thinner than No. 30, 2c. per ℔. advance.
Metal, in width 1 in. to ⅛ thinner than No. 30, 3c. per ℔. advance.
Metal, in width ⅛ in. to ¼, to No. 30, 2c. per ℔. advance.
Metal, in width ⅛ in. to ¼ thinner than No. 30, 5c. advance.
Metal, ¼ in. in width and less, 10c. per lb. advance

GERMAN SILVER MARKET METAL AND WIRE

	Market Metal.	Wire.
4 per cent., 12 in., to No. 26	$0·60	$0·80
6 " " "	·70	·90
10 " " "	·80	1·10
15 " " "	1·00	1·35
18 " " "	1·10	1·50
20 " " "	1·20	

German Silver Sheets over 12 in. wide, and weighing more than 10 ℔s., $2 per ℔., net.
Advance 2c. for each additional in., in width above 12 in., and 2c. per ℔. on each No. thinner than Nos. 26 to 36 inclusive.
All German Silver thinner than No. 36 is Platers', at 50c. per ℔. additional.
German Silver Scrap one-third less than net price of 12 in. Market Metal. German Silver Turnings, Filings and Chips, half the price of Scrap.

BRASS AND COPPER WIRE.

	High Brass.	Low Brass.	Gild'g and Cop'r.
Nos. 0 to 20	0·30	0·34	0·40
Nos. 21, 22, 23	0·31	0·35	0·42
Nos. 24 and 25	0·32	0·36	0·43
Brass Rods, No. 8 and larger	0·36	0·40	0·46
Wire straightened and cut, smaller than No. 8	0·40	0·44	0·50

Fancy Wire not less than 4 cents per pound advance of Round Wire.
Spring Wire, 2 cts. per lb. advance.

FINE WIRE, BY THE OLD ENGLISH FINE WIRE GAUGE.

	High Brass.	Low Brass.	Gild'g and Cop'r.
No. 26	0·41	0·45	0·51
No. 27	0·44	0·48	0·54
No. 28	0·46	0·50	0·56
No. 29	0·48	0·52	0·58
No. 30	0·50	0·54	0·62
No. 31	0·52	0·56	0·66
No. 32	0·56	0·60	0·71
No. 33	0·60	0·64	0·81
No. 34	0·64	0·68	0·91
No. 35	0·69	0·73	1·03
No. 36	0·78	0·82	1·15
No. 37	0·98	0·98	1·28
No. 38	1·28	1·28	1·58

Ten cents per pound extra for Spooling.

TUBING. ℔ ℔
Plain to No. 20 inclusive, above ⅜ in. to 1½ in.......$ ·44
" 1½ to 3 in. inclusive.......... ·38
" above 3 in.......... ·50
Nos. 21, 22, 23, two cents advance on List for each Number.
Nos. 24, 25, 26, four cents advance on List for each Number.
Above No. 26, special rates.
Plain ⅛ inch.......... ·50
" 5-16 "..........·60
" ¼ "..........·80
" 3-16 "..........1·20
" ⅛ "..........1·60
All Mandrel Drawn Tubes, 5 cents advance on List Prices.
Fancy Tubing, 4 cents advance on List above Plain.
English, Scotch and Extra Patterns Fancy Tubing to No. 20, 9 cents above Plain.
Tubing Sawed or Cut 2 to 4 feet long, 2 cents advance on List.
Add to 2 cents ½ cent for each additional cutting under two feet.
All Mandrel Drawn Tubes under ⅜ in., 25 cents per pound advance

ZINC TUBING.
Plain.......... ·28
Fancy.......... ·31
Scotch and Extra Patterns.......... ·34

GERMAN SILVER TUBING.
4 Per cent.......... ·85
6 "..........·95
9 "..........1·10
12 "..........1·25
15 "..........1·40
16 Per cent..........1·45
18 "..........1·55
20 "..........1·65

MISCELLANEOUS.
Common Plain Brass Pail Ears.......... ·30
Hose Pipes, 500 and over.......... ·71
" under 500.......... ·76
Door Rail.......... ·40

SCRAP.
High Brass Scrap, 16 cents.
Low " 18 cents.
Gilding, 20 cents.
Turnings, Filings and Chips, half the price of Scrap.
Orders for Goods on this list received on or after this date, will be filled at the rate herein stated.
Terms—Net cash. No discount allowed. Interest to be added after thirty days.

ANTIMONY..........14½c. gold

LEAD—DUTY: Pig $2 per 100 lbs.; old Lead, 1½ cent per lb.; Pipe and Sheet, 2½ cents per lb.
Spanish..........7c gold
German Refined..........6¾c gold
English..........6¾ @ 7c gold
American..........6 @ 6½c gold
Bar..........dis 10 %..........8¾c.
Pipe..........dis 10 %..........9c.
Tin Lined Pipe..........dis 10 %..........16½c.
Sheet..........dis 10 %..........9½c.
Shot..........dis 10 %. Drop, 9½c. Buck, 10½c.

BABBITT METAL.
N. P. U..........℔ ℔ 8½ @ 9c
A., 25c.; B, 20c.; C, 15c.; D, 12c. ℔ ℔.

SOLDER..........No. 1, 15c.; No. 2, 14c

STEEL—DUTY: Bars, Ingots, Sheets and Coils, valued at 7 cents per lb., or under, 2¼ cents; over 7 cents, and not above 11, 3 cents per lb. over 11, 3½ cents per lb. and 10 % ad val. Railway Bars 1¼ cents per lb. Railway Bars, in part Steel, 1 cent per lb. Provided, that Metal cemented, cast or made from iron by the Bessemer or pneumatic process, of whatever form or description, shall be classed as

American Cast Steel.
Tool..........15 @ 16c
Spring..........10c
Homogeneous..........12½c
Tire..........12½ @ 13½c
Machinery (round and square)..........10 @ 11c
File..........11c
Sheet..........14 @ 16c
Saw Plate, mill and mulay..........14 @ 16½c
Saw Plate, gang and X cut..........13 @ 14c
" circular as to size..........18 @ 30c

Chrome Steel.
Tool..........℔ ℔ 20 @ 21c
Tool, extra fine.......... " 40 @ 75c
Spring..........℔ ℔ 12c and upward
Machinery..........℔ ℔ 14c
Hammer.......... " 15c,
Gun or Homogeneous.......... " 16c

English Steel.—payable in gold, net.
" Best Cast..........℔ ℔ 17½c
" Extra Cast.......... " 18½c
" Round Machinery, Cast.......℔ ℔ 10½ @ 11½c
" Swaged, Cast.......... " 19½c
" Best Double Shear.......... " 17½c
" Blister, 1st quality.......... " 14½c
" " 2d quality.......... " 13 c
German Steel, Best.......... " 11½c
do 2d quality.......... " 10½c
" 3d quality.......... " 9½c
Sheet Cast Steel, 1st quality.......... " 17½c
" " 2d quality.......... " 14½c
" " 3d quality.......... " 12½c
File Steel, Flat and ½ Round.......... " 12½c
" Square and Round.......... " 12½c
" Mill.......... " 13½c
" Taper to 4 inch.......... " 16c
" Taper 3 and 3½ inch.......... " 18c

SPELTER—DUTY: In Pigs, Bars and Plates, $1 50 per 100 lbs.
Silesian, cash..........6¾ @ 7c., gold
American..........7¼ @ 11c., currency

TIN—DUTY: Plates, Sheets, Tagger and Terne, 1·1c per lb.; Electro-galvanized Plates, 2 cents per ℔; Manufactures of, not enumerated, 35 per cent. ad val. Bars, Block and Pigs, free. Banca, subject to duty of 10 per cent.
Banca..........℔ ℔ 28c., currency
Straits..........℔ ℔ 23c., currency
English..........℔ ℔ 22½c., currency

TIN PLATES, CURRENCY PRICES.
I C 10x14, Prime Charcoal..........8·75
12x12, "..........9·25
14x20, "..........9·50
I X 10x14, "..........11·00
12x12, "..........11·50
14x20, "..........12·00
D C 12½x17 "..........8·25
D X 12½x17 "..........10·50
For each additional X add..........2·25

COKE TIN PLATE.

	Best.	2d Quality.	Ordinary.
I C 10x14	$8·60	8·00 @ 8·25	7·75 @ 8·00
I C 12x12	9·00	8·25 @ 8·50	
I C 14x20	9·25	8·50 @ 8·75	7·75 @ 8·00

TERNE PLATE.

	Prime Char.	2d qual.	Coke.
I C 14x20	$ 8·25	7·75 @ 8·00	7·50 @ 7·75
I X 14x20	10·50		
I C 20x28	17·50	16·25 @ 16·75	15·75 @ 16·00
I X 20x28	22·50		
I C 20x20			

ZINC.—DUTY: Pig or Block, $1 50 per 100 lbs. Sheet 2½c. ℔ ℔.
Sheet..........cask 10½c
"..........open 10½c

Paper Stock, Old Metals, &c

(Dealers' Selling Price.)
Canvas linen..........6 @
" cotton, No. 1..........6½ @ 6¾
" " No. 2.......... @ 3½
White linen rags, No. 1..........6½ @
" " No. 2..........4½ @
Colored..........2½ @
Mixed woolens..........2½ @ 3¼
Soft woolens..........5½ @ 6½
Gunny bagging..........2 @ 2½
Jute Butts..........2½ @ 2¾
Kentucky bagging..........5½ @ 5¾
Book stock..........4 @ 4½
Waste paper and scraps..........1 @ 1½
Rope cuttings..........1½ @ 3
Kentucky Bale rope..........4 @ 4½
Oakum junk, No. 1..........5½ @ 5¾
" No. 2.......... @ 4
Grass rope..........3½
Tarred Shaking..........1½ @ 1¾
White Collar Cuttings, all paper..........7 @
" " muslin lined..........5 @
" Envelope "..........7 @
Hard White Shavings, No. 1..........6½ @
Soft " " No. 1..........6 @
White Shavings, No. 2..........5½ @
Mixed Shavings, part white..........4 @ 4½
Imperfections, No. 2, best folded sheets..........5 @
" 1, Heavy Stock..........4½ @
Book Stock, Mixed..........3½ @
" No. 2, light..........2½ @ 2½
Prints..........1½ @ 2
Pure Manilas..........2½
Bogus Manilas and Hardwares..........1 @ 1½
Commons..........1 @ 2
Binders' Board Cuttings..........1½ @ 1
Straw Board Cuttings..........1½ @
Woolen Tailor Clips..........12 @
Satinet Tailor Clips..........1½ @

Old Metal.
Copper.......... @ 18
Yellow metal..........14 @
Brass..........13 @ 14
Heavy Composition..........16 @ 17
Old lead, solid..........6 @ 6½
Tea lead.......... 5½
Zinc..........5 @ 5½
Pewter, No. 1..........17
" No. 2..........10 @ 12
Spelter.......... @ 5
Wrought iron..........per ton $30·00
Machinery iron..........per ton $17·00
Light Iron..........per ton $16·50
Stove plate..........per ton $14·00
Burnt Iron..........per ton $11·00

Paints, Oils, etc.

Paints.
Black lamp—Coach Painters..........℔ ℔ 20c
" " Ordinary..........8c
" Ivory Drop, fair..........18c
" " best..........26c
Black Paint, in oil..........kegs, 8c.; ass't'd cans, 11 c
Blue, Prussian, fair to best..........50 @ 75c
" " " in oil..........35 @ 65c
" Chinese dry..........88c
" Ultramarine..........25 @ 30c
Brown, Spanish..........1½c
" Van Dyke..........9c
Carmine, 40..........$12 00
Green, Chrome..........15 @ 23c
" in oil..........18 @ 25c
" Paris..........good, 30c; best, 40c
" " in oil.......... 30c " 45c
Mineral Paints..........1½ @ 4c
Orange Mineral..........14c
Red Lead, American..........9½c
" English..........10½c
" Venetian (N. C.) dry..........2½c
" " in oil..........ass't'd cans, 11c; kegs, 8½c
" Indian, dry..........10c
Rose Pink..........13c
Sienna, American, Raw..........4c
" Burnt..........4½c
" " in oil..........16 @ 26c
" Raw " ....15 @ 25c
Umber, Burnt..........4 @ 8c
" in oil..........16 @ 21c
" Raw..........3½ @ 7½c
" " in oil..........16 @ 22c
Vermilion, Chinese..........1 60, gold
" English..........90c., gold
" Trieste..........1 10
" American, Common..........23c
White Lead, American, pure dry..........10c
" " in oil..........11c
White, Paris, English, prime..........in bbls. 2½ @ 2¾c
Yellow Ochre, French..........2½ @ 2¾c
" " in oil....ass't'd cans, 11c; kegs, 8½c
" " Vermont..........in casks 1½c
Yellow Chrome..........17 @ 27c
" in oil..........18 @ 28c
Zinc White, American No. 1 dry..........9c
" " 1, in oil..........11c
" French (Paris)..........11c
" " in oil..........12c

Oils.
Linseed Raw..........℔ gal. casks, 62c. bbl., 63c
" Boiled.......... " 67c. " 68c
Whale, Crude..........
" Bleached Winter.......... 75c
Sperm, Crude..........bbl. 1·65
" Winter unbleached.......... " 1·9
" " Bleached.......... " 2·00
Seal, Extra Refined.......... "
Lard, Pure Winter.......... " 1·15
" Spring.......... " 1·05
Cotton Seed, Crude.......... 62c
" Southern Yellow.......... " 67c
" White.......... "
Neatsfoot, Winter..........70c @ $1·10
Natural Lubricating..........33c @ 40c

Sundries.
Asphaltum..........9c
Benzine..........℔ gal. 16c
Chalk..........1½c
" Block..........
Dryer, Patent, Am'n..........ass't cans, 10½c.; kegs, 9c
" " English.......... " 10c.; " 9c
Flocks..........
Frostings..........50c
Glue, White..........33 @ 47c
" Sheet..........20c
Glaziers' Points, Zinc..........9c
Gum, Copal..........38c
" Damar..........25c
" Shellac, English..........75c
" " " dark..........65c
Litharge..........10c
Pumice Stone, selected Lumps..........4 @ 6c
" powdered..........4c
Putty in bladders..........3½c
" in bulk..........3c
Rotten Stone, soft, English..........8c
Spirits Turpentine..........40c
Whiting, Spanish..........¾c

Glass.
French Window—1st, 2d, 3d, and 4th qualities. Per box of 50 feet.

SINGLE THICK.

SIZES.	I.	II.	III.	IV.
6 x 8 to 10 x 15	$7·50	$6·75	$6·25	$5·75
11 x 14 to 16 x 24	8·50	7·75	7·25	6·50
18 x 22 to 20 x 30	10·75	9·75	8·75	7·75
15 x 36 to 24 x 30	12·25	10·75	9·00	
26 x 28 to 24 x 36	13·00	11·50	9·75	
26 x 36 to 26 x 44	14·50	13·25	10·75	
26 x 46 to 30 x 50	15·00	14·00	11·25	
30 x 52 to 30 x 54	16·00	14·50	12·00	
30 x 56 to 34 x 56	17·25	15·50	13·50	
34 x 58 to 34 x 60	18·25	17·25	15·00	
36 x 60 to 40 x 60	20·75	18·75	17·25	

DOUBLE THICK.

SIZES.	I.	II.	III.	IV.
6 x 8 to 10 x 15	$12·00	$11·00	$10 00	$9·25
11 x 14 to 16 x 24	13·75	12·50	11 75	10·50
18 x 22 to 20 x 30	17·25	15·75	14·00	
15 x 36 to 24 x 30	19·75	17·25	14·50	
26 x 28 to 24 x 36	21·00	18·50	15·75	
26 x 36 to 26 x 44	23·25	21·25	17·75	
26 x 46 to 30 x 50	24·00	22·50	18·00	
30 x 52 to 30 x 54	25·75	23·25	19·25	
30 x 56 to 34 x 56	27·75	25·00	21·75	
34 x 58 to 34 x 60	29·25	27·75	24·00	
36 x 60 to 40 x 60	33·25	30·00	27·75	

Sizes above—$12·00 per box extra for every 5 inches.
An additional 10 per cent. will be charged for all Glass more than 40 inches wide. All sizes above 52 inches in length, and not making more than 80 united inches will be charged in the 84 united inches bracket
Discount 50&5 %.

Steel.

THREE CLASS PRIZE MEDALS, CLASSES 1, 21, 22, Great Exhibition of Industry LONDON, 1851.

MEDAL OF HONOUR, SOCIETY OF ARTS & INDUSTRY, LONDON, 1856.

1st CLASS PRIZE MEDAL, CLASS 1st UNIVERSAL EXHIBITION OF INDUSTRY PARIS, 1855.

LOCKER BROTHERS,

(Limited.)

SUCCESSORS TO

SAML. COCKER & SON,

(Established 1752.)

SHEFFIELD, ENGLAND.

MANUFACTURERS OF

CAST, SHEAR, SHEET AND BLISTER STEEL, OF EVERY DESCRIPTION.
BEST CAST STEEL WIRE, ADAPTED SPECIALLY FOR MECHANICAL PURPOSES;
Also for ROPES, NEEDLES, FISH HOOKS, PINS, CRINOLINE, &c.

BEST CAST STEEL FILES, SAWS, EDGE TOOLS,
HACKLES, GILLS, CARD CLOTHING, CARD TEETH, HACKLE AND GILL PINS,
FISH HOOKS, NEEDLES, &c.

ALSO

GENERAL MERCHANTS.

WM. JESSOP & SONS,

MANUFACTURERS OF

STEEL,

AND IMPORTERS OF IRON

SHEFFIELD, ENGLAND.

PRINCIPAL DEPOTS:

NEW YORK, Nos. 91 and 93 John Street.....BOSTON, No. 141 Federal.
ST. LOUIS, No. 714 North Second Street.

AGENCIES

PHILADELPHIA, Jas. C. Hand & Co.....PROVIDENCE, Nightingale & Kilton.
CHICAGO, Crerar, Adams & Co.....NEW ORLEANS, Folger & Co.
CINCINNATI, Augustus Wessel.....SAN FRANCISCO, Huntington, Hopkins & Co.

F. W. MOSS,

Successor to **JOSHUA MOSS & GAMBLE BROS.**

FRANKLIN WORKS, WADSLEY BRIDGE WORKS, WALKLEY WORKS, } SHEFFIELD, ENGLAND.

MANUFACTURER AND IMPORTER OF

STEEL AND FILES.

Principal Depots: 80 John St., N. Y., and 512 Commerce St., Phila.

MOSS & GAMBLE **SUPERIOR C. S. "FULL WEIGHT" FILES,**

Cast Steel Hammers and Sledges. Also, "M. & G." Anvils and Vises.

WARRANTED CAST STEEL, especially adapted for DIES and TURNING TOOLS, DRILLS, COLD CHISELS, PUNCHES and all kinds of MACHINISTS' TOOLS.
Celebrated Improved Mild Centre Cast Steel, for Taps, Reamers, and Milling Tools, warranted not to crack in hardening Taps of any size.
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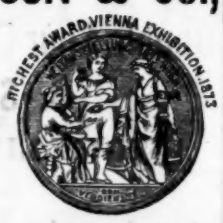

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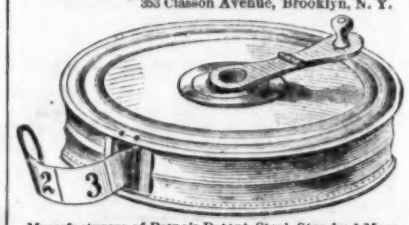

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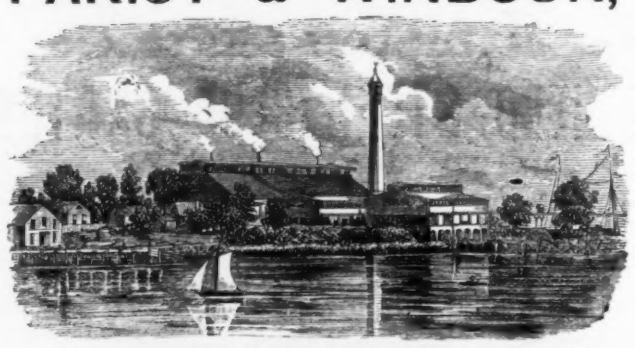

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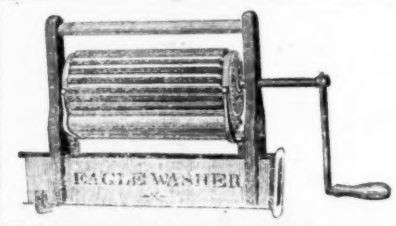

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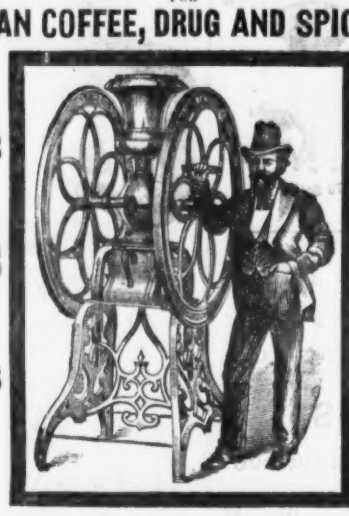

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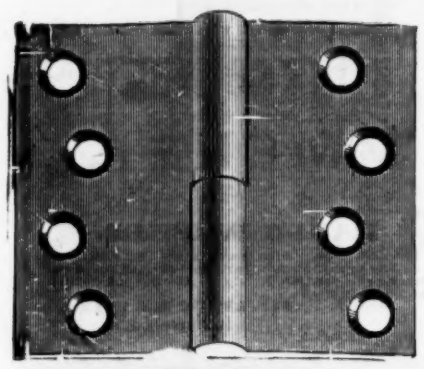

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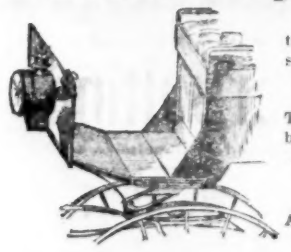

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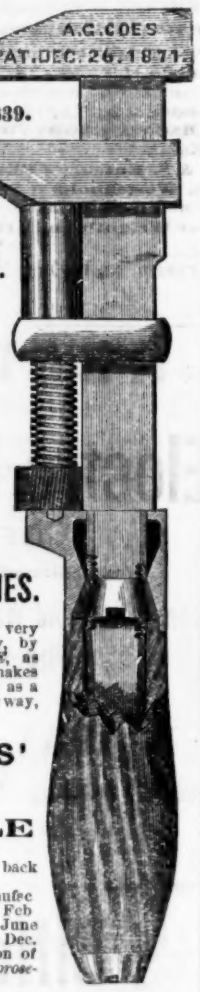

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CONNELL'S PATENT TRIP GONG BELLS.

WITH BRONZED STEEL, POLISHED BRASS AND NICKEL PLATED CAPS.

Also Manufacturers of the Celebrated

THUMB LATCH DOOR BELLS.

Acknowledged by the Trade to be the Best Door Bells made.

Our Catalogue and Appendix is now ready. Price $4·50 and charge remitted on receipt of subsequent orders.

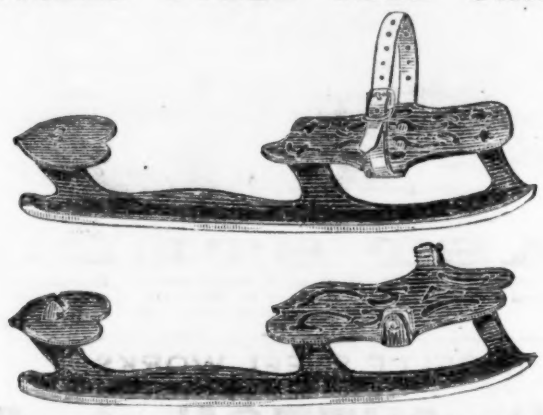
J. CLARK WILSON & CO.,

P. O. BOX 2355.

81 Beekman Street, New York.

Northampton Skate Co.,

SHEFFIELD STEEL CLUB SKATES.



THE BEST IN THE WORLD.

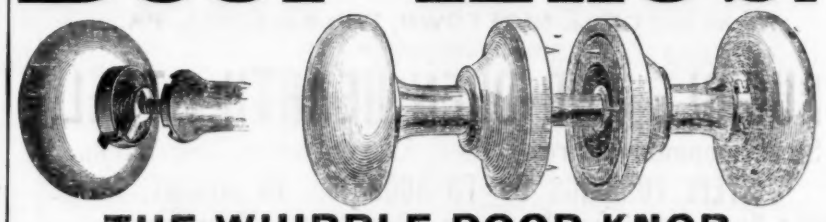
No Buckle to break. NO STRAPS to stop Circulation.

SELF-FASTENING.

FOR SALE BY ALL HARDWARE DEALERS.

WHIPPLE'S PATENT

Door Knob.



THE WHIPPLE DOOR KNOB

Is the only perfect Door Knob Attachment ever invented.

AWARDED A BRONZE MEDAL

At the American Institute Fair, in New York, for 1874.

NO SCREWS USED IN NECK OR ROSES.

Adjusts Perfectly to Doors of Different Thicknesses

WITHOUT THE USE OF RINGS.

The attention of Architects, Builders and Carpenters is specially desired. Circulars fully describing the advantages of this Knob, with Price List, sent on application to

The Parker & Whipple Co.,

WEST MERIDEN, CONN.,

Or 97 CHAMBERS STREET NEW YORK.

CAPEWELL'S

GIANT NAIL PULLER.

Saves Hozes, Nails and Labor.

Sold by all House Furnishing and Hardware Jobbers.

MALTBY, CURTISS & CO.,

MANUFACTURERS,

34 Reade Street, New York.

Manufacturers of ROSE WOOD, MAPLE AND METAL KEY FAUCETS.

PHILADELPHIA.

(Corrected weekly by Lloyd, Supplee & Walton).

Terms, 30 days. For 60 or 90 days, interest added at 10 per cent. per annum.

Anvils.—Solid Cast Steel.....₩ ℔ 14c
Peter Wright's, ₩ ℔, gold.....11½c
Wilkinson's " .....11 c
Eagle.....list 14 cents—dis 20 @ 20&10 %
Apple Parers.—Victor.....per doz $7 75
Domestic " " 7 75
Reading " " 7 75
Bay State Paring, Coring and Slicing..... " 15 00
" " Peach Parers..... " 10 50
10 d. z. lots 5oc. per dozen discount.
Axes.—
Mann's (according to weights)..Per doz. $11 50 @ 10 00
Red Indian, " " " " 12 00 @ 11 00
Red Chiefrain, " " " " 12 00 @ 11 50
Crown Prince " " " " 12 50 @ 11 50
Hunt's
Augers and Auger Bits.—Pierce's Pat.
Twist Bits.....dis 30 %
Douglass' & Ives' Bits.....dis 40&10 %
Connecticut Valley Auger Bits.....dis 40&10 %
Cook's Bits.....dis 40 10&10 %
Jennings' Bits.....dis 10 %
Jennings' Bits.....dis 30&10 %
Bates' Nut Augers.....dis 40&10 %
Douglass' & Ives' Augers.....dis 40&10 %
Watrous' Ship Augers.....dis 10&15 %
Bonney's Pat. Hollow Augers.....dis 25 %
Stearns' Patent Hollow Augers.....dis 25 %
Balances.—
Landers, Frary & Clark's..... } Sold on Morton's new
Morton's..... } List.....dis 50 %
Chattillon's.....
Common Spring with Hook.....₩ doz $1 38 @ 2 00
Bells.—bevin Bros. Mfg. Co. Light Hand Bells.....dis 70 %
Common (Tissue Paper Weight).....dis 70&10 %
Swiss Pattern Hand Bells.....dis 50 %
Connell's Door Bells.....dis 50&5 @ 50&10 %
Gt. Western & Kentucky Cow..dis 50&10 @ 50 10&5 %
Boring Machines.—Bates' Mfg. Co., complete with augers.....dis 20 @ 25 %
Douglas Mfg. Co., complete with augers..dis 20 @ 23 %
Common Boring Machines, no Augers.....$4 00 @ 8 75
" " " ..... 5 00 @ 4 75
Angular.....dis 75 %
Bolts.—Eastern Carriage Bolts.....dis 75 %
Western " " .....dis 75 %
Philadelphia " " .....dis 60 %
" Eagle, (Coleman's).....dis 60 %
Wrought Shutter, Stanley.....dis 50 @ 50 x 10 %
Braces.—Barber's.....dis 40&5 %
Fackus.....dis50 %
Bartholomew's American Ball....dis 10&10 @ 15&10 %
Snoffard.....dis 50 %
Butts.—Cast Fast Joint, Narrow...dis 25&10 @ 30&10 %
" " Broad.....dis 35&10 @ 40&10 %
Cast Fast Loose Joint.....dis 45&10 @ 50&10 %
" Acorn, Loose Pin.....dis 4 %&10 @ 45&10 %
" Mayers & Parliament.....dis 35&10 @ 40&10 %
" Acorn Jap'd.....dis 45&10 @ 50&10 %
Wrought Loose Pin.....dis 35 %
" Table Hinges and Back Flaps.....dis 30 %
" Narrow.....dis 30 %
" Loose Joint.....dis 35 %
Parker's Bling Butts.... } Discount 67 %; by the case
Buffalo Hdw. Co. " .... } 65&10%.
Clark's " "
Shepard " "
Lull & Porter's (Phila.) Hinges....dis 60 %; case, 60&5 %
Garretson's No. 0 Hinges..... } 65&10 %
Cherryiree No. 0 " .....
Chains.—German Halter.....dis 20 %
" Coil.....dis 20 %
Galvanized Pump.....net 13 @ 13½c
Best Proof Coil Chain—

₩ ℔	12½	9½	8¼	8¼	3	7¾	7c gold
	3-16	¼	5-16	⅜	7-16	½	⅝ in.

By the cask, 560 lbs., ½c per lb. less Common Chain, ½c per lb. less.
Chisels.—Socket Framing.....dis 60 @ 60&10 %
Socket Firmer.....dis 60 @ 60&10 %
Tang " .....dis 40&10 @ 50 %
Beaty's Framing and Firmer.....dis 2 %
Casters.—Iron Bed.....dis 30&10 @ 40 %
Porcelain Wheel Bed.....dis 40&10 @ 50 %
Iron and Brass Wheel Plate.....dis 60 @ 60&10 %
Porcelain Wheel " .....dis 50 @ 50&10 %
Clothes Wringers.—Universal.....per doz $72 00
Novelty.....72 00
Discount on 2 dozen lots, $2 per dozen.
Coffee Mills.—Common Box and Side.....dis 15 %
Patent Box and Side.....dis 15 %
Cutlery.—American Pocket (best).....dis 25 %
Landers, Frary & Clark, J. Russell & Co. and Lamson & Goodnow Mfg. Co. Manufacturers' net prices.
Drawing Knives.—Hart Mfg. Co.'s.....dis 60 %
Adjustable Handle.....dis 10 @ 15 %
Beatty.....dis 15 @ 20 %
Fry Pans.
Tinned.....dis 40 @ 45 %

₩ doz.	$3 50	4 00	4 50	5 00	5 50	6 50	7 50	9 00	10 00
No.	0	1	2	3	4	5	6	7	8

Burnished.....dis 30 @ 45 %

₩ doz.	$3 00	3 75	4 25	4 75	5 25	6 00	7 00	8 00	9 00
No.	0	1	2	3	4	5	6	7	8

Files.
Nicholson Mill Files.....new list
" Bastard.....
" Taper.....
Butcher's Mill.....$4 75 to £ gold
" Bastard.....4 75 to £ gold
" Taper.....4 75 to £ gold
Fluting Machines.
K. F. M.—4½ in. rolls.....$3 75 net
" —6 in. rolls.....4 00 net
Mrs Knox—4½ in. rolls.....3 75 net
" —6 in. rolls.....4 00 net
Hammers.
Yerkes & Plumb's.....dis 15 @ 20 %
Hammond & Son's.....dis 15 @ 20 %
Veree.....dis 30 @ 25 %
Hatchets.
Beatty's.....dis 25 %
Shingling and Half. { ₩ doz. $7 00 7 50 7 75 8 00
{ No. 1 2 3
Yerkes & Plumb.....dis 20 @ 25 %
Shingling and Half. { ₩ doz. $7 00 7 50 8 00 8 50
{ No. 1 2 4 4
Claw..... { ₩ doz. $7 50 8 00
{ No. 1 2 3
Hinges.
Strap and T.....dis 50 %

Horse Nails.	Nos.	6	7	8	9	10
Ausable		27	25	24	23	22
Globe		28	26	25	24	23
Brundage		26	24	23	22	21
	Nos.	5	6	7	8	9
Putnam		32	28	26	25	24

On Ausable, Globe and Brundage 1000 ℔ lots.....dis 5 %
Knobs.—Door, Mortise and Rim.
Makes in Combination.....new list dis 45&5 %
Extra discount for cash 2 %
Mineral and Rim.....dis 5 %
Locks and Latches.—Rim and Mortise....dis 40&5 %
Extra discount for cash 2 %
Till and Cupboard.....dis 25 %
American Padlocks.....dis 50 %
Extra discount for cash 2 %
Scandinavian Pad Locks.

₩ doz.	$10 50	10 50	12 00	12 00	15 00	15 00 }	dis 25 %
No.	59	59½	60	60½	61	61½ }	
₩ doz.	$18 00	18 00	27 00	27 00 }	dis 25 %		
No.	61	62½	63	63½ }			

Trunk Locks.....dis 5 @ 10 %
Thumb and Roggens Latches.....dis 25 %
Lanterns.—Square Candle and Oil.....dis 10 %
Globe for Oil.....dis 10 %
" " Kerosene.....dis 10 %
Tubular Lanterns.....dis 10 %
Mattocks.—Long and Short Cutter.....dis 25 %
Western Pattern.....dis 25 %
Pennsylvania Pattern.....dis 15 %
Molasses Gates.
Enterprise Mfg. Co.'s Measuring Faucets.....dis 30 %
Stebbins' Gates.....dis 62½ @ 62½&10 %
Lincoln's " .....dis 40&10 @ 50 %
Landers, Frary & Clark's Petroleum.....dis 15&10 %
Taylor's Petroleum Faucets.....dis 20&10 %
Brass Liquor Cocks.....dis 20&10 %
Meat Cutters.—Dixon's.....dis 20 %
Woodruff.....dis 20 %
Stowe.....dis 20 %
Hale's.....dis 35 %
Stuffers.....dis 20 %
Planes.—Auburn Tool Co.. "Bench.....dis 40 %
Second Quality.....dis 50 %
Metallic Plane Co.....dis 25&5 %
Evans Pat. Circular.....net
Plumbs and Levels.
Adjustable.....dis 60&10 %
Non-Adjustable.....dis 60&10 %
Plane Irons.—American.....list net
Butcher's.....gold £, $5 50
Picks.—Philadelphia.....net
Pittsburgh.....net
Rules......dis 60&10 %
Rakes.—Cast Steel Garden.....dis 40 @ 40&5 %
Malleable Garden.....dis 40 @ 40&5 %
Wood Head Iron Teeth.....dis 40 %
Steelyards.—American Pattern.....dis 15 %

₩ doz.	$5 50	7 00	9 00	1 00	11 00	12 00
No.	50	100	150	200	250	300

English Pattern.....dis 15 %

₩ doz.	$7 00	8 67	10 67	12 67	14 67	16 67
No.	50	100	150	200	250	300

Hart's Pattern.....dis 50 %

₩ doz.	$14 50	17 75	21 00	26 50	31 00	35 50
No.	50	100	150	200	250	300

Scythes.—Golden Clipper, Damascus Blade, Boxed and Sharpened.....₩ doz. $10 00
Clipper No. 10, Bronzed Blade Boxed and Sharpened.....₩ doz. $9 50
Clipper No. 8, Painted Red, Boxed and Sharpened.....₩ doz $9 00
Cast Steel Scythes.....$7 50 @ 8 00
German " .....6 50 @ 7 00
Squares.—Steel and Iron, new list.....dis 50 %
Saws.—Disston's Cross Cut.....dis 15 %
Disston's Hand.....dis 12½ %
W. McNiece's H'd, Cross-Cut & Circ'r, new list..dis 15 %
Boynton's Lightning, new list.....dis 40 %
" Champion.....dis 45 %
Shovels and Spades.
Rowland's Plain Back, Jan. 3d.....dis 35 %
" Back Strap.....dis 35 %
Oliver Ames & Sons.....dis 20 %
Bradley Shovel Co.....dis 20&5 %
Sad Irons.—Richmond (polished face).....per lb. 8½c
Richmond (polished face)..... by the cask " 8¼c
Stone.—Arkansas Oil, No. 1.....₩ ℔ $.
Turkey Oil, No. 1.....net " 38c
Washita Extra.....net " 30c
" No. 1.....net " 25c
" " 2.....net " 5½c

Screws.
United States and others in Combination.....dis 40 %
Keystone, not in Combination.....dis 40&5 %
Spoons.—
Plated.....dis 40&10 @ 50 %
Britannia, Boardmans (new list).....dis 50&10 %
" Parkers (old list).....dis 50 @ 50&10 %
German Silver.....dis 30 %
" Light.....new list dis 35 %
Salance & Grosjean Iron......dis 70 %
Springs.—Gray's Door.....dis 60&10 %
Torry's Door.....dis 60&10%
Stocks and Dies......dis 10&5 %
Stove Polish.—Gem.....₩ gross, $5 00
Onyx.....$5 00
Try Squares.—Winterbottom.....dis 10 @ 15 %
Stanley Rule and Level Co.....dis 45&10 %
Willis Thrall, No. 2.....dis 30&10 %
Disston's No. 2.....dis 40 %
Tacks, &c.—Half Weight Tacks.....dis 72½ %
" " by the case...dis 72½&7½ %
Clout and Finishing Nails.....7½ %
" " by the case.....dis 7½ %
Traps.—Genuine Oneida—Newhouse list.....dis 20 %
Imitation " " ...dis 30 @ 35 %
Vises.—Solid Box, currency.....₩ ℔ 13½c
Wrenches.—Coes Genuine.....dis 40&5 @ 40&10 %
Coes Imitation Wrought Bar.....dis 50&10 @ 10 %
" " Malleable Bar.....dis 60&10 %
" " (Kellogg) Malleable Bar.....dis 65&10 %
Tafts Pattern (Wrought Bar).....dis 70 @ 70&10 %
Philadelphia Tool Co.'s Pat. Duplex.....dis 25 %
" " " Improved Baxter.....dis 25 %
" " " Adjustable Fork.....dis 25 %
Wire.—No. 0 to 18.....(Advanced April 24th)..dis 47½ %
No. 19 to 25.....dis 50 %
No. 27 to 36.....dis 52½ %
Coppered 6 to 12.....dis 15 @ 20 %
Tinned Broom Wire.....dis 35 %
Galvanized Wire No. 1 to 18.....dis 40 %

BUFFALO.

Reported by Messrs. Sidney Shepard & Co.
November 8, 1875.

Augers—Snell Mfg. Co.....dis 25 %
Axes—Francis.....
Bits, Auger—Snell Mfg. Co.....dis 25 %
Phœnix.....dis 40 %
Bells, Cow—Yaw's Genuine.....dis 25 %
Braces—Bit, Spofford's Patent.....dis 50 %
Brads, Cut.....dis 50&7½ %
Boards—Stove, Brooks' Pat. dis 35 % 4 mos.; 35&5 % 30 dys
Belting—Rubber.....dis 30 @ 10 %
Leather, new list, oak tanned.....dis 30 @
Brick—Bath (box of 2 doz) Best English.....$1 25
" Rutherford.....$1 00
Can Openers—Sprague's.....dis 50 %
Cases—Parlor Coal Hod.....dis 15 %
Chalk—White, Carpenter's.....₩ gross, 57c
Red, Carpenter's.....90c
Chisels—Firmer Socket.....dis 60, 10&10 %
Framing Socket.....dis 60, 10&10 %
Corner Socket Chisels.....dis 60, 10&10 %
Slick's Carpenters'.....dis 60, 10&10 %
Castings—Malleable.....₩ ℔ 9½c
Cutters—Meat, "Hidden".....35 %
Egg Beaters—"Peerless".....per doz $3 00
" "Centripetal".....per doz 5 00
Elbows—Corrugated.....dis 10 %
Adjustable.....dis 10 %
Flies—Maischoss Bros.....dis 20 %
Fluters—Geneva Hand.....dis 20 %
Freezers Ice Cream—"Champion".....₩ doz. $15 00
Hammers—Henry W. Kip's.....dis 33½ %
Hinges, Gate—Shepard's.....dis 30&10 %
Hinges—Window Blind—
Shepard's and Standard.....dis 60, 10&5 %
Hoes, Coes—Plain, Black and Galvan'd...new list dis 15 %
Funnel, Black and Galvanized.....dis 15 %
Fancy and Helmet.....dis 15 %
Sad Irons.....
Kettles—Brass.....30½c
Copper, "Hand Made".....₩ ℔. 35c
Enameled.....40c
Knives, Drawing—Oval No. 1.....dis 60, 10&10 %
Razor Blade.....dis 50&10 %
Lanterns "Peerless, ...No. 1 5 10
₩ doz $36 00 $10 50 $13 75 dis 10 %
Tubular.....$11 00
" with Guards.....
Machines—Apple Paring, "Keystone".....7 75 ₩ doz
Machines—Boring, Snell's.....dis 20 %
Mills, Coffee—Box and Side, common.....dis 15 %
Box Union and Eagle.....dis 15 %
" American.....dis 30 %
Molasses Gates—"Self Measuring".....dis 20 %
Nails—Clout and Finishing.....dis 7½ %
Shoe.....dis 7½ %
Cut, "Chesapeake," 10d.....$5 10
Horse, Ausable.....No. 5 7 8 9 10
30 27 25 24 23 22c
" " Pointed & Polished.....add 1c ₩ ℔
1000 lbs.....
" Clinton.....No. 6 7 8 9 10
21 19 18 17 16c
Packing—Rubber.....dis 30 @ 10 %
Paint—White Lead, U. S. Gov't.....₩ ℔ 8½c
Pans—Dripping.....₩ ℔ 10c
Rivets—Iron, Black and Tinned.....dis 25&7½ %
Screws—"American Screw Co"—
Flat Head, Iron.....dis 30%
Flat Head, Brass.....dis 30 %
Sieves—Wood, Hoop Iron.....$1 35
Tinned.....1 75
Skates and Straps—White's.....dis 30 %
Spoons, Iron Tinned.....dis 30 %
" by the case.....dis 20 %
Plated Rogers' A No. 1.....dis 50 %
Britannia.....dis 50&10 %
G. S. Hall, Elton & Co.....dis 30&5 %
Squares—Steel and Iron.....new list 50 %
Scales—Buffalo Scale Works.....dis 25 %
Fairbanks.....dis 15 %
Stove Polish—Gem.....₩ gross, $4 50
" Dixon's.....6 00
Tacks—Half Weight Am. Iron.....dis 72½&7½ %
Tea Trays.....
Tools—Machinists' and Tinmens'.....dis 10 %
Vases—Palace Coal.....dis 15 %
Vises—
Parallel, Buffalo...Old pattern, dis. 30 %; new, do. dis 20 %
Ware—French, Tinned and Iron.....dis 20&10 %
Stamped and Japanned.....dis 10 %
Cast Iron Hollow.....dis 40 %
Wire—Bessemer Steel.....dis 10 %
Tin Plates.—Add for each X.....2 50
10x14, IC. Charcoal.. $9 50 } 14x20 C. terne.....$8 75
12x12, " ... 10 00 } 20x28 C. " 19 50
12½x17, " ... 9 00 } 20x28 X. " 24 00
14x20, " ... 10 50 }
Pig Tin—Straits.....25c @ 26c
Bar Tin.....24c
Solder—No. 1, Crook's.....16 c
Sheet Zinc—
"Lasalle".....570 ℔ casks
$10 50 10 80 ₩ 100 ℔s
Sheets.....$10 50
Babbitt Metal.....₩ ℔ 12c
Iron Wire—Bright and Annealed.....dis 45 %
Coppered.....dis 40 %
Tinned.....dis 25 %
Tinned Broom, { Nos. 20 21 22
{ 20c 21c 21c } dis 35 %
Copper—Sheathing 14 @ 18 oz.....₩ ℔ 30c
Planished.....₩ ℔ 37c @ 38c
Bottoms.....₩ ℔ 32c
Bolts.....₩ ℔ 31 @ 35c
Braziers' Sheets.....₩ ℔ 31 @ 33c
Sheet Iron.—
18 Common.....$4 05
24 Common.....4 25
26 Common.....4 45
24 W. D. Wood & Co., Smooth Finish.....5 25
Planished.....A. B.
14c 11c
Gen. Russia, No. 1 stained.....16c
" clean.....15c
Galvanized.....dis 33½ %

CINCINNATI.

Reported by Sellew & Co., Importers and Jobbers Metals, No. 214, 216 and 218 Main street.
November 1, 1875.

Tin Plate.—I. C. 10x14 Charcoal.....$9 50 @ 10 00
I. X. 10x14 Charcoal.....12 00 @ 12 50
I. C. Terne 14x20.....8 75 @ 9 5
I. C. Terne 20x28.....10 50 @ 11 00
I. C. 20 inches Continuous.....11 00
Block Tin.—
Pig.....₩ ℔ 25c
Bars.....₩ ℔ 26c
Solder.—
A 1.....₩ ℔ 16
Roofing.....₩ ℔ 14
S. & Co.....₩ ℔ 19c
Lead.—Pig.....₩ ℔ 7½c.
Bar.....₩ ℔ 8½c
Copper.—
Ingot.....₩ ℔ @ 24c
Planished....." @ 38c
Sheathing....." @ 31c
Copper Drops....." @ 34c
Sheets, 6 to 7 lb.....@ 37c
" 8 to 9 lb.....@ 35c
" 10 to 12 oz.....@ 33c
" 13 lb. up.....@ 31c
Copper Bottoms.....@ 33c
Zinc. Casks, 500 to 1000 lbs.....₩ ℔ 10½ @ 10¾
Case, 100 lbs.....10¾ @ 11 c
Slab.....7½c
Brass.—Roll, No. 6 to 30.....₩ ℔ 30c
Roll, No. 30 to 38.....35c
Wire, No. 0 to 20.....35c
" 20 to 30.....40c
Babbit Metal.—Sellew & Co.....30c
Allens'.....30c
Market.....12c
Antimony.....₩ ℔ 17c
Bismuth.....₩ ℔ $4 00
Nickel.....₩ ℔ $3 50
Russia Iron.—Bundle.....₩ ℔ 16c
Less than bundle.....₩ ℔ 18c
No. Stained.....₩ ℔ 15c @ 16c
Sheet Iron.

	Com. B.	Fin. S.	L. U.	Smooth D	Smooth Re'fd.
15 to 20	4c	5 10c			7 10
22 to 24	3 90c	5 30c			6 90
26	4c	5 80c			7 05
27	4 20c	5 40c			7¼
30	5½c				

Galvanized Iron.—Full bundles.....dis 30 %
Nos. 15 to 20.....12c | No. 26.....14c
22 to 24.....13c | 27.....15c
Bar Steel.—Silver, ₩ ℔ 16c Crescent, 21c.
Iron Wire.....dis 35 %
Enameled Ware.....dis 50 %

One Piece Corrugated Elbows.....dis 10 %

Charcoal Iron.		Russia Iron.	
4½ inch.....	₩ doz $2 50	4½ inch.....	₩ doz $5 00
5 "	" 3 50	5 "	" 7 00
5½ "	" 4 50	5½ "	" 7 50
6 "	" 5 00	6 "	" 12 00
7 "	" 6 50	7 "	" 14 00

Leader Elbows, Flat Crimp Retinned or Galvanized.—Dis. 10 %

	₩ doz.		₩ doz
2 inch.....	$1 75	2½-inch.....	$2 75
3-inch.....	2 25	3½-inch.....	3 25
4-inch.....	2 50	4½-inch.....	3 50

Sheet Iron Bread Pans.....₩ ℔ 8½c
American Broilers.....₩ doz. $13 50
Tinmen's Machines.....dis 5 %
Sad Irons.—I X L's.....₩ ℔. 8½c
Brass Kettles.—Ansonia.....45c
Dog Irons.....3 c

PITTSBURGH.

The following are the Card rates of Lewis, Oliver & Phillips, H. B. Newhall, 11 Warren St., New York, Agent. Iron, standard list assorted sizes, for large orders, specifications to include Bands, small Rounds and Ovals, 2½c. rate, 2 % off net.
Flat Rail (1¼x¼), punched and coun'sunk..4 1c ₩ ℔ net
Iron Wedges.....4½c ₩ ℔ net
Norway Nail Rods.....8½c ₩ ℔ net
Crow Bars (in ordering please state whether "Wedge" or "Pinch" point).....4¾c ₩ ℔ net
Beetle Rings.....8 c ₩ ℔ net
Fence Pickets—
¾ round, bent to shape, 25c ₩ ft. of fence, less 15 % off net.

Discount off Standard List.

Carriage and Tire Bolts.....75 % off net
Carriage and Tire Bolts delivered on cars or boats in Pittsburgh.....
Stove Bolts.....20 % off net
Machine and Square Head Bolts.....40&10 % off net
Coach and Lag Screws.....40&10 % off net
Bolt Ends.....40 % off net
Pat. Hot Pressed Square and Hexagon Nuts, small sizes, from 3-16 to ⅝ in.....5½c ₩ ℔ off net
Pat. Hot Pressed Square and Hexagon Nuts, large sizes, from 7-16 to 2 in.....6½c ₩ ℔ off net
Washers, all made from new band iron, small sizes, from 3-16 to ⅝ in.....9½c ₩ ℔ off net
Washers, all made from new band iron, large sizes, from 7-16 to 1⅜ in.....7½c ₩ ℔ off net
Nuts and Washers in 25 lb. boxes, ½c ₩ ℔ ex. Nuts and Washers in lots less than one keg each size, ½c ₩ ℔ ex. Nuts and Washers in 5 lb. boxes, 1c. ₩ ℔ ex. net prices.
Standard Caps, for Plows.....5½c. ₩ ℔ net
Iron Harrow Teeth, in lots of 1 ton or more, packed in 200 lb. boxes, 1 in. diam. 3¼c ₩ ℔ net; ⅞ in. diam. 3½c ₩ ℔ net; ¾ in. diam. 3¾c ₩ ℔ net.
Patent Headed Harrow Teeth, packed in boxes ½c ₩ ℔ ex
Skein Bolts, in bulk, in lots of 1 keg or more, ⅝ in. diam. 5c ₩ ℔ net; 9-16 in. diam. 6c ₩ ℔ net; ⅝ in. diam. 7c ₩ ℔ net. 1c ₩ ℔ extra when less than 1 keg of each size is ordered.
Strap & T Hinges...33½&10 % off net, delivery as custo'ry
Screw Hitching Rings.....$5 25 ₩ 100 net
Bridge and Roof Bolts—
1 to 2 in. diam. over 8 ft. long.....₩ ℔ 3½c net
1 to 2 in. diam. from 4 to 8 ft. long.....4 c net
1 to 2 in. diam. from 1½ to 4 ft. long.....4½c net
⅝, ¾ and ⅞ in. diam. over 4 ft. long.....4¾c net
⅝, ¾ and ⅞ in. diam. from 1½ to 4 ft. long.....5 c net
Bridge bolts with upset ends.....¼c. ₩ ℔ extra
Wrought iron plates, punched.....1¼c. ₩ ℔ net
Cast Iron Washers.....₩ ℔ 3½c net
Duck Nest Tuyere Irons.....$14 50 ₩ doz net

WAGON HARDWARE.

Wagon Box Strap Bolts—
10 in. long by 7-16 at Screw End, ₩ set of 8 bolts.. 45c
12 " ½ " " 8 " .. 55c
10 " 9-16 " " 8 " .. 65c
12 " 9-16 " " 8 " .. 70c
14 " 9-16 " " 8 " .. 80c
10 " ⅝ " " 8 " .. 80c
12 " ⅝ " " 8 " .. 90c
14 " ⅝ " " 8 " .. 90c
16 " ⅝ " " 8 " .. 1 00
18 " ⅝ " " 8 " .. 1 10
20 " ⅝ " " 8 " .. 1 20
5c ₩ set for each additional inch over 14 in. All lengths made.
In ordering Box Strap Bolts please give diameter at Screw End.
Wagon Box Rods, narrow track, each.....15c
" " wide track, each.....17c
Single Tree Irons, ₩ set of four pieces.....30c
Wrought Iron Bolster Plates, 2¾ in. wide, ₩ set.....45c
" " 3 " " 50c
" " 3¼ " " 55c
" " 3½ " " 60c
Wagon Brake Ratchets, each.....11 c
" " finished with guard, each..13 c
Wrought Hammer Straps, heavy pattern, each.....13 c
" " light " each.....12 c
" Rub Irons, each.....9 c
Stay Chain Hooks, each.....5½c
Double and Single Tree Clips, figure 1, each.....8 c
" " " 2, each.....9 c
" " " 3, each.....11 c
Axle Clips, Round Part ⅝, Flat Part 1¼, each.....8c
Wagon Clevis, including Pin, complete, each.....10c
Pole Caps, each.....24c
Single Tree Hooks, Nos. 1 and 2.....½c
Strap Bolts, Rods, single Tree Irons, Bolster Plates, Brake Ratchets, Hammer Straps, Rub Irons, Stay Chain Hooks, Clevis and Pin, Clips, Single Tree Hooks and Pole Caps, in lots of 50 sets.....dis 15 %
Wagon Box Staples, 1¼ to 2¼ in. to clinch ₩ 1000 $11 00 net
" " " Bevel Box Iron, to rivet on ₩ 1000 7 50 net
Neck Yoke Eyes, each.....4¼c net
" with ⅝ rings, each.....7¼c net
King Bolts, ⅝, 1, 1¼, and 1½ in. diam.....₩ ℔ 4½c net
Wagon Rivets, ex. large, flat, oval and steeple head, ¼ in. diam. all lengths.....5½c net
Wagon Rivets, 3-16 in. diam., all lengths.....9¼c net
" ⅝ to 1 inch long.....₩ ℔ 1c extra
" & Nails, in 5 ℔ paper boxes.....1c extra
" in 25 ℔ wood " .....½c extra
Wagon and Hinge Nails, ⅛ in.....₩ ℔ 17 c net
" 3-16 in.....19 c net
Wagon Rivets and Nails, in less lots than one keg each size.....½c extra
Double Tree Plates.....5c net
Coupling " .....5c net
Tongue " .....8½c net
Neck Yoke Plates.....10½c net
Tongue Cap Iron, 1¾, 2 & 2¾ in. wide, same price ₩ ℔ as Band Iron.
Wagon Chains, Stay, Lock and Tongue, 5-16 in, ₩ ℔ 10¼c net. ⅜ in.. 11½c. net
Above prices are free on board cars in Pittsburgh. Subject to change of market, without notice.

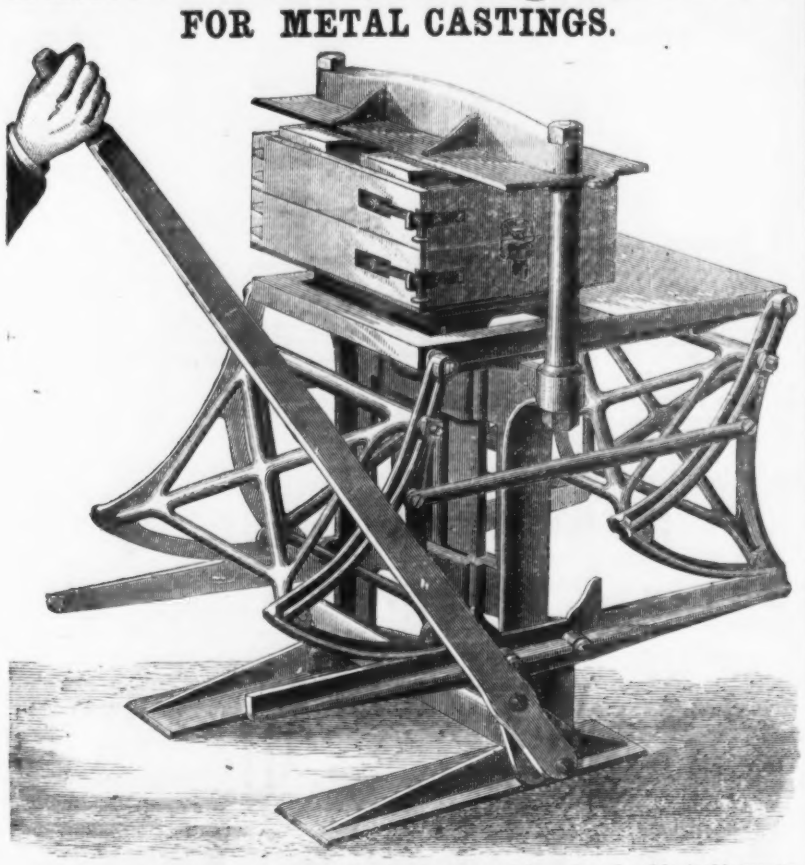
DETROIT.

(Reported by Messrs. Jewett & Root.)
Nov. 8. 1875.

Tin Plate.—Best Charcoal
IC. 10x14.....₩ 9 75
IX. 10x14.....12 25
XX. 10x14.....14 75
IC. 12x12.....10 25
IX. 12x12.....12 75
IC. 14x20.....10 75
IX. 14x20.....13 25
XX. 14x20.....15 75
XXX. 14x20.....18 25
XXXX. 14x20.....20 75
DC. 100 Plate.....9 25
DX. " 11 75
DXX. " 14 25
DXXX " 16 75
DXXXX 100 Plate..19 25
IX. 14x14.....19 25
IC. 10x14 W.....9 25
IX. 10x14 W.....11 75
Roofing Tin.—Best Charcoal
IC. Terne, 14x20.....₩ 9 00
IX. " 14x20.....11 00
IC. Terne, 20x28.....19 00
IX. " 20x28.....24 00
Coke Tin.—
IC. 10x14 Coke.....₩ 9 00
IX. 10x14. Coke.....11 50
IC. 14x20. " 10 00
Solder.—No. 1.....16c
No. 2.....15c

Pig Tin.—
Large Pigs.....24c
Small Pigs.....25c
Bars.....26c
Bright Wire.
63 lbs. in bdl.....dis —
Copper.—
Sheathing.....31c
Copper Bottoms.....32c
Planished Copper.—
Sheathing, 14x48.....38c
Boiler Size, No. 7.....40c
" " No. 8.....40c
" " No. 9.....40c
Sheet Iron.—
No. 18 Am. Com.....4 00
No. 24 Am. Com.....4 20
No. 26 Am. Com.....4 40
No. 27, Am. Com.....4 60
W. D. WOOD'S & CO.'S SHEET IRON.—
Nos. 15 to 20 Smooth ₩ 90
" 21 to 24.....5 20
" 25 & 26.....5 40
" 21 to 24 Char'l..6 70
" 25 & 26 " ..6 90
RUSSIA.
Genuine.....17c
Imitation.....14c

Eames' Pat. Molding Machine
FOR METAL CASTINGS.



The above machines have recently been introduced in several large iron foundries in this country, where they have given entire satisfaction. Among the advantages are :

1st. A great saving in the cost of producing castings.

2d. A man can learn to mold with the machine in less than 30 days' time.

3d. The castings produced will be found more perfect, less poor work, and more uniform than if molded by the old method.

The machine is adapted for either Iron or Brass Castings. *Price Reduced.* For further particulars, send for Circular. Address,

P. & F. CORBIN,
EXCLUSIVE LICENSES,

Also Manufacturers of *Architectural Bronze Work, Locks, Hinges and fine Builders' Hardware generally.*

New Britain, Conn. New York, 87 Chambers St.

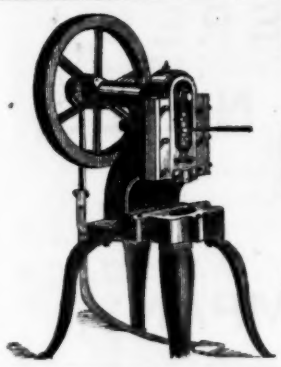
JARECKI'S ADJUSTABLE PIPE TONGS.

Gas			
No. 0,	Burner to	⅜	$3·00
No. 1,	⅛	to 1	3·50
No. 2,	⅜	to 1½	4·00
No. 3,	½	to 2½	5·00
No. 4,	¾	to 3½	9·00
No. 5,	2½	to 6	16·00

Liberal Discount to the Trade.

It takes but a second to adjust them to any sized pipe within their range. The Steel Jaw is reversible, so that either end may be used. One end having fine teeth, which adapts it for grasping **Brass Pipe, Bolts and Studs,** which are not crushed by its use. A very useful tool about an **Engine, Lathe, Factory or Machine Shop.**

JARECKI MANUFACTURING CO., Erie Pa.



A. H. MERRIMAN.
Patent Power
Punching Presses.

Patentee and Sole Manufacturer.

Patented May 26, 1868; June 22, 1875; Oct. 11, 1875; and Nov. 16, 1875.

West Meriden, Conn.

STOVE LID LIFTER.
KETTLE TIPPER.

AMERICAN MFG. CO., 102 Orange Street, New Haven, Conn.

☞ Send for Circulars. See Notice page 9 Nov. 11.

CENTENNIAL
SELF-LUBRICATIVE
Hemp Piston Packing
FOR
Locomotives, Steamships, Stationary Engines,
Hot or Cold Water Pumps.

Recommended by Master Mechanics and Engineers, as the cheapest and best in market. **No more Extortionate Prices. No more Fluted Rods**—but a good article at fair price.

JOHN CANFIELD & CO.,
SOLE MANUFACTURERS,
Office, 1321 Fairmount Ave., Phila.
PATENT APPLIED FOR. Send for Circular.

GOLD MEDAL
Non-Extensible Razor Belt.

PATENTED JULY 25, 1871.
RE-ISSUED MAY 13, 1873, and JUNE 9, 1874.

In this Strap the liability of the leather to stretch and become loose and porous is prevented by the a patented non-extensible base, which supports the leather and secures

PERMANENT ELASTICITY.

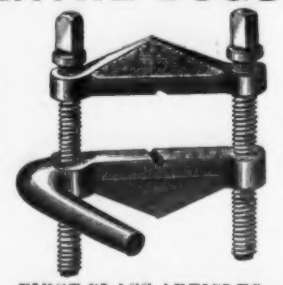
We make this style with single rod, double rod, and wood frames, and intend that it shall, in quality compare favorably with our other well known brands.

BENJAMIN F. BADGER, Manufacturer,
Badger Place, Charlestown, Mass.

BILLINGS & SPENCER CO.

MANUFACTURERS OF
CLAMP, DIE AND COMMON
LATHE DOGS.

Vienna, 1873



Forged from Bar Steel And Hardened

Under Billing's Patent Process.

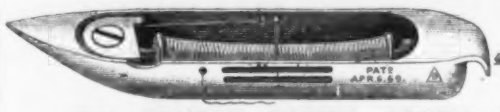
For Progress.

FIRST CLASS ARTICLES,
and something that every machinist and Tool Maker will appreciate.
Also, all Descriptions of **Wrought Iron & Steel**

DROP FORGINGS.

For Machine Handles, Lathe Wrenches, Spinning Rings, Marlin Spikes, Clinch Rings, Thumb Screws, Thumb Nuts, and Parts of Drill Chucks, Sewing Machines, Guns, Pistols, and

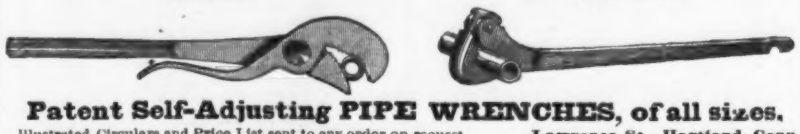
Machinery Generally.



TRADE B MARK.

THE BILLINGS PATENT SEWING MACHINE SHUTTLE,

Thirty Varieties now made, Forged Solid from Bar Steel and Cold Pressed. Also,
Barwick **Wheatcroft**



Patent Self-Adjusting PIPE WRENCHES, of all sizes.

Illustrated Circulars and Price List sent to any order on request. Lawrence St., Hartford, Conn.

HAMMER & CO.,
Branford, Conn.,

Manufacturers of the following *Patented* Articles of

MALLEABLE IRON:

Hammer's Adjustable Clamps.
Hammer's Malleable Iron Oilers.
Hammer's Mall. Iron Hand Lamps.
Hammer's M. I. Hanging Lamps.

For Sale by all the principal Hardware Dealers.

Malleable Iron Castings
Of Superior Quality made to order.

MOLDING MACHINE,

New and Improved.

T. F. HAMMER'S PATENT.

Beside all advantages Molding Machines possess over hand molding, it is especially claimed for this machine, that:

It occupies no more room than a bench for hand molding.

It requires no special flasks or boards, but the same are used as for hand molding.

The light is not obstructed by any part of the machine, as the pressure plate is swung back as shown in the engraving.

Price List on application.

T. F. HAMMER,
Branford, Conn.

Malleable Iron Castings made to Order.

☞ Two First Premiums awarded by Franklin Institute Exhibition of 1874.

C. VAN HAAGEN & CO.,
2341 and 2343 Callowhill Street, PHILADELPHIA, PA.

Manufacturers of Latest Improved Machine Tools, Rotary Shapers, two sizes, Iron Planers, all sizes, Horizontal Drill Attachments, for upright power drills, Self-feeding Portable Drills, hand or power, Expansion Boring Bars, five sizes, Universal Slide Rest, for taper work, Twist Drill Sharpening Machines, automatic and adjustable in every direction, Noiseless Friction Gears, for transmitting up to thirty horse-power.
Send for Descriptive Circulars.

BUSH HILL IRON WORKS,

Corner 16th & Buttonwood Streets
PHILADELPHIA.

JAMES MOORE,

(Successor to MATTHEWS & MOORE,)

Engineer, Machinist, Founder and Boilermaker

CASTINGS of every description.

ROLLING MILL AND FURNACE EQUIPMENTS COMPLETE

Rolls Turned for Rails, Beams, Angles, and all shapes for Iron, Steel, or Composition Metals.

Sugar Mill, Saw Mill and Grist Mill Machinery,
AND MILLWRIGHTING IN GENERAL.

BOILERS—FLUE, TUBULAR AND CYLINDER, and all kinds of TANK AND PLATE IRON WORK.

CLARK TOMPKINS
Manufacturer and Patentee of
UPRIGHT ROTARY
Knitting Machines,

Cone Winders for Hosiery Yarns,
NAPPERS FOR HOSIERY GOODS,
Stop Motions & Alarms for Knitting Machines,
Flock Cutters, and Flock Renovators.
EXTRA PARTS FURNISHED PROMPTLY.

☞ I am also prepared to furnish anything in the line of Gear Cutting from 5½ feet to ⅛ of an inch in diameter, any shape of tooth desired; Racks, Worms, Worm Wheels, Screws any size or number of threads to the inch, Wood Planing, Iron Planing, Large Lathe Work, Gear Cogging, Shafts, Hangings and Pulleys, also all kinds of Mill Work, Jobbing, and Machinery in general.

Shop, Foot of Cypress St., Troy, N. Y.

Particular attention paid to Experimental Machinery. We aim to maintain our reputation for doing work well.

REPORT OF JUDGES

In Department V, Group 3, at the 44th Exhibition of the

AMERICAN INSTITUTE,
Held in the City of New York, Oct., 1875.

No. 318, Drawing, Drop & Punching Presses.

THE STILES & PARKER PRESS CO.,
Of Middletown, Conn.

The machinery exhibited by these makers is of a character that calls for special commendation. In addition to their well known punching presses, to which a new feature has been added in a press adjustable to an inclination for discharging work left above the die, there are exhibited by them a combined punch and shears, a drawing or blanking press, and a drop.

In all these there is shown the highest mechanical culture, applied to meet every practical requirement, to avoid every practical difficulty, and to enlarge the range of application of the machines, by devices which are at once simple, elegant, and effective.

Your committee would unhesitatingly recommend for this exhibition the "Medal of Progress," but find such award debarred by the rule of the Institute, forbidding such award unless a Silver Medal has been previously awarded We, therefore, respectfully recommend the award of a Silver Medal.

Silver Medal Awarded.

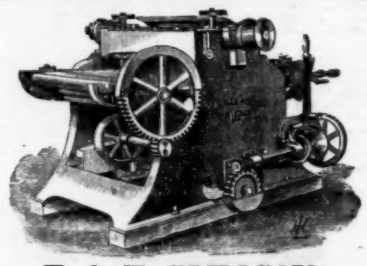
A true copy from the Report on file.

JOHN W. CHAMBERS, Sec'y.

JOSEPH WALKER, Prop. H. B. LYONS, Manager.

NEW MACHINERY WAREROOMS
915 Market Street, Philadelphia.

Hampson, Whitehill & Co.'s Stationary, Portable and Hoisting Steam Engines; Shive Governors, a Sure Regulator; Machists' Tools, (the Pratt & Whitney Co.'s,) of world-wide reputation; Knowles' and Pulsometer Steam Pumps; Jones' Scales, "The Test;" Union Emery Wheels, and General Machinery.



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Manufacturers of
IMPROVED WOOD TOOLS.
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The **Scientific American** is the cheapest and best illustrated weekly paper published. Every number contains from 10 to 15 original engravings of new machinery, novel inventions, Bridges, Engineering works, Architecture, Improved Farm Implements, and every new discovery in Chemistry. The Scientific American has been published weekly for 30 years, and stands foremost of all industrial papers. A year's numbers contain 832 pages and several hundred engravings. Thousands of volumes are preserved for binding and reference. The practical receipts are well worth ten times the subscription price. Terms, $3·20 a year by mail, including postage. Specimens sent free. May be had of all News Dealers

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Address for the Paper or concerning Patents.

Munn & Co., 37 Park Row, New York
Branch Office, cor. F and 7th Sts., Washington, D. C.

CROSSLEY'S Patent Lubricator, OVER 11,000 In Use.

Corner **Adams & John Sts., Brooklyn, N. Y.**

HOLSKE MACHINE CO.,
279 Cherry St., near Jefferson St.

ELEVATORS
For Hotels & Stores a specialty.

Machinery in General made to order.

BOSTON.

(*Reported by Macomber, Bigelow & Dowse, 156 to 164 Oliver St.*)

Anvils.—"Eagle American"........per lb. 10c; dis 20 %
Augers.—Watrous Ship..........dis 10 %
L'Hommedieu Ship..........dis 15 %
Axes.—Forester's Favorite, Bronzed..........$11 50
Blue Jackets, Blue.......... 11 00
Excelsior, Black.......... 10 50
Chopper's Pride, Bronzed.......... 10 50
Red Cross, Red.......... 9 00
Red Cross, Handled.......... 12 00
Boy's Handled Blue Jackets.......... 11 00
Axe Handles.—Wadleigh's Oak—
A (Extra) $2·50. B (No. 1) $2·00. C (No. 2) $1·50 ℔ doz
Bells, Sleigh—
Fancy Body, Patent Leather, Cloth Bound, White Metal, 30, No. 1..........$1·70
Fancy Body, Patent Leather, Cloth Bound, White Metal, 36, No. 1.......... 1·80
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, 30, No. 1.......... ·38
Fancy Body, Patent Leather, Leather Bound, Extra Tinned, 36, No. 1.......... 2·50
Fancy Body, Patent Leather, Leather Bound, Silver Plated, 30, No. 1.......... 3·38
Fancy Body, Patent Leather, Leather Bound, Silver Plated, 36, No. 1.......... 3·50
Shaft, Strap, White Metal, House Bells, extra, 6, No. 1..........per pair, 50c.
Common, 6, No. 1.......... 45c.
Blind Hinges.—
Orr or Washburn's..........per hundred sets $9 50
Blind Fasts.—
Orr or Washburn's..........per hundred set $6 00
Bolts.—Carriage, Phila., "Girard Works....dis 50&10 %
Borax.—Best Refined..........℔ lb 15c
Borers.—Angle, Backus'..........dis 30 %
Boring Machines.—Angle..........each $4 75
Common, Snell's quality..........each 3 75
Braces.—Barber's..........dis 40&5 %
Backus'..........dis 50 %
Spofford's..........dis 50 %
Amidon..........dis 50 %
Brackets.—Star Bronzed..........new list net
Star Japanned..........new list net
Store Shelf..........new list net
Brass Faucets.—L. F. & C..........dis 25&10 %
Brushes—Horse, Patent Metallic........per doz. $4·50
Butts.—Union Drilled Loose Joint..........dis 45&10 %
" " Wire Fast Joint......dis 25&10 %
" " Acorn Loose Joint...dis 45&10 %
Brass Butts..........dis 30 %
Wrought Table Butts and Back Flaps ......revised list, dis 30 %
Wrought Narrow Butts..........reduced, dis 30 %
Can Openers—Sprague's..........dis 50 %
No. 1, Iron Handle..........$4·00
No. 2, Wood Handle.......... 4·50
Cards.—
Curry Cards, No. X, per doz., $0·38..........dis 30 %
Horse " No. X, " 0·80..........dis 30 %
Wool " No. 8X, " 2·80..........dis 15 %
Cotton " No. 10, " 3·50..........dis 10 %
Cartridges.—U. S. Cartridge Co..........dis 60 %
Chisels.—"Buck Bros." Shank Goods........add 22½ %
Socket..........add 25 %
Churns.—Lightning—
Redheffer patent.......... 3 4 5 6 gall
per doz $22 00 $27 00 $31 50 $36 00
Coal Hods..........dis 40 %
Fancy Japanned, No. 4, 15 in., $8·00; 5, 16 in., $9·00; 6, 17 in., $10·00.
Fancy Galvanized, No. 4, 15 in., $11·50; 5, 16 in., $13·00; 6, 17 in., $14·00.
Perfection, Jap'd, No. 4, 15 in., $12·00; 5, 16 in., $13·00; 6, 17 in., $14·00.
Perfection, Galv'd, No. 4, 15 in., $15·00; 5, 16 in., $16·00; 6, 17 in., $17·00.
Morning Glory, Jap'd, No. 4, 15 in., $12·00; 5, 16 in., $13·00; 6, 17 in., $14·00.
Morning Glory, Galv'd, No. 4, 15 in., $15·00; No. 5, 16 in., $16·00; No. 6, 17 in., $17·00.
Compasses and Dividers.—Bemis'..........dis 40 %
P. S. & W..........dis 30 %
Cordage.—Manila (usual trade dis.)..........℔ lb, 14½c
American Tarred Hemp Lath Yarn..........℔ lb. 10c
Corn Hooks..........per doz $2·75
Cow Ties..........dis 10 %
No. 30, Open Ring, 3 foot, No. 6, with Toggle.....$3·70
No. 35, " 3 " No. 6, " Snap....... 3·90
No. 40, " 3½ " No. 6, " Toggle.... 4·00
No. 45, " 3½ " No. 6, " Snap....... 4·30
No. 50, " 4 " No. 5, " Toggle.... 4·70
No. 55, " 4 " No. 5, " Snap....... 4·80
No. 60, " 4½ " No. 4, " Toggle.... 5·20
No. 65, " 4½ " No. 4, " Snap....... 5·40
Crow Bars.—Iron, Steel Points..........℔ lb, 5½c
"Sweet" Steel Bars..........℔ lb 11c
Brown's Steel Bars..........℔ lb 10c
K. P. & Co. Extra Drill Steel..........℔ lb 15c
Dividers.—Cook's Nickel Plated..........dis 15 %
Door Springs.—Moseley—
Per doz..........$9·00 12·00 15·00 18·00 24·00
No.......... 0 1 2 3 4
Torrey's..........$3·00
Gem..........1, $3 50; 2, $2 50; 3, $2 00 ℔ doz
Egg Beaters.—Lightning, Redheffer pat., pints, $5 50; 1 qt., $8 00; 2 qts., $12 00 per doz.
Emery.—Alden..........℔ lb 6½c
Wellington Mills..........℔ lb 10c
Files.—Earl Smith & Co.'s English........ $5 to £ gold
American..........$5 to £ currency, less 15 %
Nicholson..........new net list
Wheeler, Madden & Clemson.......... $5 to £
Stubb's Tapers, genuine, 3 in., $1·50; 3½, $1·62; 4, $1·88; 4½, $2·18; 5, $2·50.
Funnel Irons.—$2·50 2·50 2·50 3·25 per doz
5, 5½, 6, 7 inch.
Deep Flange.—$2·50 3·75 4·00
5, 5½, 6 inch.
Hammers.—Maydole..........dis 12 %
M., B. & D., solid cast steel, adze eye, No. 1, $10; 1½, $9·75
" " " " " " bell face, No. 1, $11; 1½, $9·75.
Hangers & Rollers.—Novelty..........dis 30 %
Anti-Friction..........dis 30&5 %
Hatchets.—Underhill Edge Tool Co..........dis 15 %
C. F. Dowse, warranted Cast Steel—
Shingling..........0, $4·75; 1, $5·25; 2, $5·75
Claw..........1, 5·75; 3, 6·25
Lathing..........1, $5·50
Axe Pattern..........1, $7·00; 2, 7·50
Broad....0, $5·75; 1, $6·50; 2, $7·50; 3, $9·25; 4, $10·75; 5, $12·75; 6 $14·75
Hinges.—Strap and T, Stanley Works..........dis 40 %
Plate, Loose and Fast Joint..........℔ lb 6c
Wrought Screw Hook..........℔ lb 6½c
Knobs.—Young's Imp. Silverd Glass..........dis 45 %
Lanterns.—Tubular No. 0..........$ 9·50
Guarded, No. 74, (with kerosene oil and candle burners).......... 5·50
Anti-Tubular.......... 8·00
Lead.—Sheet, 9½c.; Pipe, 9c..........less 10 %
Locks.—Norwalk Lock Co......reduced list, dis 40&5 %
Mattocks.—
K. P. & Co., axe finish, long cutter..........$13 00—net
Short cutter.......... 12 75—net
Meat Cutters.—"Miles's" Challenge..........dis. 20 %
No. 1, $22·00; 2, $30·00; 3, $40·00.
Metal.—Babbitt, No. 1, 35c; 2, 25c; 3, 16c; 4, 15c ℔ lb
Nails.—10d and larger..........$3 25 net
Nail Pullers.—Little Giant—Small.....per doz., $22·00
Little Giant—Large.......... " 30·00
Padlocks.—Wilcox..........reduced list, dis 40&5 %
All Brass, 2½ inch, 2 keys, job lot..........$9 00
Paper.—Tar'd Sheathing..........℔ lb 2 c
Dry Sheathing.......... " 3 c
" " "Beaver Brand" Rosin Sized.. " 3½c
Tar'd " " " .... " 3 c
Felt " " " .... " 4½c
Virginia Cane Fibre..........4½c
Picks.—K. P. & Co., Solid Eyes..........5 to 6 6 to 7
$9 00 $9 50
Pins.—Universal Hat and Coat all wood—
2 in........℔ gross $2 50; 3 in., 3 50; 4 in., 4 50—dis 15 %
Potato Digger.—
"Partridge," 6 square tine..........℔ doz $12 00
Shumway & Co., 6 round tine..........℔ doz 9 00
Pulleys.—Axle.
Frame Pol. Wheel....No. 150, 30c., 1½ in.; 16, 38c., 2 in.
Common Axle........No. 18, 34c., 1½ in.; 26, 40c., 2 in.
Milled Axle.........No. 2, 42c., 1½ in.; 3, 50c., 2 in.
Nashua Pat. Axle Bronzed Face...1½ in., 80c; 2 in., 90c
Cast Steel Axle..........2 in., $1·00
Pulley Blocks.—"Best Boston Make"..........net

Common Strapped Blocks—

	4	5	6	7 inch.
Single,	75c.	88c.	$1·00	$1·13 each.
Double,	$1·00	1·12	1·25	1·60 "

Inside Iron Strapped Blocks—

	5	6	7			10 inch.
Single,	$1·00	1·13	1·38	2·00	2·25	2·75 each.
Double,	1·88	2·30	2·68	3·63	4·00	5·00 "

Inside Iron Strapped Blocks, with Patent Roller Bushings—

	5	6	7	8	9	10 inch.
Single,	$1·25	1·50	1·65	2·50	2·75	3 50 each.
Double,	2·50	3·00	3·38	4·63	5·00	6·50 "

Plated Ware.—Rogers Bros..........dis 50 %
Plumb & Levels.—"Davis" Pat. Adjustable—
No. 1, Iron and Wood Center Levels..........dis 50 %
No. 2, First Quality Levels..........dis 60&10 %
No. 3, Iron Pocket " ....dis 35 %
No. 4, Level and Plumb Glasses..........dis 60&10 %
No. 5, Iron Pocket Levels, per square and straight edge..........dis 50&10 %
No. 6, Improved Iron Bench Planes..........dis 20&10 %
Pocket Knives.—Conn. Cutlery Co....... new net list
American Shear Co..........new net list
Rail Barn Door.—For Novelty and Anti-Friction Hangers..........per foot 7c., dis 30 %
Rivets.—Black..........dis 50 %
Carriage, oval head, Nos. 3, 4, 5, 6, 7, 8. dis 35 %
13 13 14 14 15 16c ℔ lb
Rubber Moldings.—"Harmon's"..........dis 10 %
No. 2, for Windows..........per foot, 5c
No. 3, for Doors..........per foot, 10c
No. 4, " ....per foot, 12c
Miller's Patent..........per foot, 4½c
Sad Irons.—Bless & Drake..........℔ lb 5c
Sand Paper—0 to 2, $4·25; 2 to 3, $4·75..........dis 10 %
Saws.—*Hand and Panel*—
Wheeler, Madden & Clemson's, same list as "Disston's"..........dis. 15&5 %
Disston's..........dis. 12½ %
Cross Cut—
Wheeler, Madden & Clemson X Cuts........per ft., 87c
" " " "Star" X Cuts. " 60c
" " " Champion X Cut. " 50c
" " " One Man X Cut..each, $2·25
Boynton's genuine Lightning X Cut........per ft., 50c
" " " One Man X Cut..each, $2·00
Circular—Wheeler, Madden & Clemson's......dis. 25 %
Mill— " " " ....dis. 25 %
Screws.—Am. Screw Co., new list Sept. 1st ....dis 40 %
Aiken's..........dis 40 %
Scythe Stones.—
"Willoughby Lake," first quality........℔ gross $6·50
" " second quality........ " 3·00
Shovels.—O. Ames..........dis 20 %
M. B. & D..........dis 20 %
Snow, Malleable Iron Tip, D Handle—Agents for New England..........$6·50
Snow, Malleable Iron Tip, long Handle—Agents for New England.......... 5·50
Sifters.—Coal, Rice, &c..........$12 00
Spading Forks.—M. & E..........dis 25 %
Stone Pickers.—"Partridge," original...℔ doz $15 00
Tools.—Aiken's Pattern, 20 in set; Parr's..$7 50 per doz
Traps.—Oneida..........dis 25 %
Blake's..........dis 50 %
Vises.—K. P. & Co.'s Solid Box, Blacksmith.....℔ lb 13c
Parker's Parallel..........dis 10 %
Backus..........dis 25 %
"Howards," Parallel..........dis 20 %
Wardrobe Hooks.—Wire to drive.......℔ gross $1 00
Weather Strips.—"Harmon's"....per doz $5, dis 10 %
Weights.—Window Weights..........℔ lb 2c
Wedges—Axe..........℔ doz 38c
Wire.—
Eureka, in spools, No. 28 to 40 assorted...℔ gross $3 50
Wire Netting.—Clinton Wire Cloth Co., Green, Drab or Black..........℔ ft 5½c
Wrenches.—Genuine Wrenches, G. A. Coes..dis 40&5 %
Walton..........dis 50 %
Wringers.—
{Novelty and Universal} Tub No. 2 {......Less than doz, $72 00 / ......2 doz or more, 70 00}
Bench A... less than 2 doz $86 00; 2 doz or more $84 00
" B... " " 94 00 " " 92 00
" C... " " 110 00 " " 107 00
Eureka..... " " 60 00 " " 58 00
Withington, Cooley & Co.—
Hoes, Rakes, Forks, &c..........dis 33⅓ %

Boston Metal Market.

(*Corrected by Fuller, Dana & Fitz, 110 North Street, Boston, Importers and Commission Merchants.*)
December 18, 1875.

Iron.—Best Refined Bar Iron..........℔ ton $52 50
"Burden Best" " " 95 00
Swedish Bar Iron..........gold " 110 00
Norway Shapes..........gold " 122 50
Norway Nail Rods..........gold " 130 00
Sheet Iron, American..........℔ lb 4½c
" " Galvanized.......... " 9 c
" " Russian..........gold " 18⅜c
Plate Iron, C. No. 1.......... " 3½c
Iron Rails..........℔ ton $47 50
Steel Rails.......... " 72 50
Pig Iron, Foundry, No. 1 extra.... " 25 50
" " No. 2 extra .... " 23 50
" Gray Forge.... " 21 50
" Scotch.... " 30 00 @ 32 00
Wrought Scrap Iron.......... " 31 00
Old Rails.......... " 28 00

Steel.—	℔ lb	German.... ℔ lb	9 c
Eng. Tool, gold	15½c	Spring..........	8 c
American Tool	14½c	Tire..........	6 c
" Mach	9 c	Sleigh Shoe......	4½c
Bessemer	7 c	Toe Calk........	7½c
Tin Plates.—℔ box gold		**Copper.**—	℔ lb
I. C. Char. 10x14.....$7·75		Ingot..........	23½c
I. C. Coke 10x14 ......7 00		Bolt..........	30c
Char Roof. IC. 14x20. 7 25		Sheathing........	30c
Coke " IC. 14x20, 6 25		**Lead.**—	℔ lb
METALS.		Pig..........	7½c
Pig Tin.— ℔ lb., gold		Sheet & Pipe....	8 1-10c
Banca..........	21c	**Zinc.**—Sheet.. ℔ lb	10½c
Straits..........	19½c	**Spelter**.......... ℔ lb	7½c
English..........	19½c	**Antimony.** gold ℔ lb	13½c

ST. LOUIS.

Corrected weekly by Semple, Birge & Co.

Apple Parers.—Conqueror..........℔ doz. $7 75
Hudson's Rotary.......... " 7 75
Axes.—Wm. Mann's, Red Warrior..........℔ doz $11 50
Wm. Mann's, W. Stewart's.......... 11 00
" C Marshall.......... " 10 50
" Handled.......... $5 extra
" Double Bitted.......... " 2. 50
H. L. B. & Co.'s, L. & Co.......... " 11 50
" Pioneer.......... " 12 00
" James & Co.......... " 11 00
Hunt's.......... " 12 00
Axles.—"Jones, Henry & Co.'s" Patent Lubricating, Half Patent, Swelled Taper, Plain Taper and Concord Axles..........dis 10 & 5 %
Common Axles (Pat. Lubricating), 1½ inch and upward..........℔ lb. 6½c.
do. less than 1½ inch.......... " 7 c.
Bellows.—Best St. Louis make..60c ℔ in. dis 20&2½ %
Bells.—Troy, Church, School and Farm Bells..℔ lb 40c
"Improved Amalgam Bronzed," 15 in., $1·90; 17 in., $2·50; 19 in., $3·75; 21 in., $5·00..........net
Belting.—"Boston Belting Co.'s Rubber........dis 40 %
"Bradford & Sharp's" Oak-Tanned Leather.... dis 30 %
Bolts.—Arms, Bell & Co.'s Carriage & Tire..dis 70&10 %
Arms, Bell & Co.'s Machine..........dis 30&10 %
Butts.—Western Butt Co.'s new list—
Narrow Fast Joint..........dis 25&10 %
Broad Fast Joint..........dis 35&10 %
" Loose " ....dis 45&10 %
Reversible..........dis 40&10 %
" Japanned and Silver Tipped.......dis 45&10 %
Loose Joint "Acorn" " " ....dis 45&10 %
Wheeling Hinge Co.'s W't Fast Joint Nar.......dis 30 %
" " Broad......dis 35 %
" " Loose Joint.......dis 35 %
" " Reversible.......dis 35 %
" " Table & B'k Flaps...... 30 %
Churns.—Julian, No. 2, $7·00; No. 3, $7·50; No. 4, $8·50..........dis 25 %
Cider Mills.
American Senior, $40·00; Am Junior, $25·00....dis 20 %
Corn Drill.—Campbell's Patent..........each $20·00
Corn Knives.—Dunn Edge Tool Co.'s Clip...℔ doz 5 00
Seymour Mfg. Co.'s Solid Steel Back...... " 4 00
Corn Shellers.—Sandwich Mfg. Co.'s—
Power Shellers..........dis 10 %
Hand Shellers..........Special rates
Cotton Gins.—The Carver, 10 in. Saw, $4 a Saw..dis 15 %
12 in. Saw, $4·50 a Saw..........dis 10 %
Crow Bars.—Steel Pointed..........℔ lb 6½c
Drag Saw Machines.—
Culver's Iron Drag Saw..........dis 10 %
Robinson's Patent Sweepstakes Drag Saw.......dis 10 %
Fanning Mills.—Nash & Cutt's..........dis 20 %
Feed Cutters.—Improved Burdick National...dis 20 %
Sanford No. 1, $10 75; No. 2, $8 00..........net
Files.—Black Diamond, Mill..........$5·00 £ currency.
" Bastard....... 5·00 £ currency.
" Taper......... 5·00 £ currency.
Forges.—Keystone Portable Forge Co.'s......dis 12½ %
Forks and Hoes.—
Auburn Mfg. Co.'s Hay and Manure Forks......dis 10 %
" " Handled Hoes..........dis 30 %
Garden Seed Drills and Wheel Hoes.
Allen's Double Wheel Hoe..........dis 5 %
" Planet Drill, Nos. 2 and 3..........dis 15 %
" Combined Drill and Wheel Hoe..........dis 15 %
Grinding Mills.—Challenge Feed Mills..........dis 15 %
Sedgebeer's Nonpareil Mills..........dis 15 %
Hammers.—Masons' Hammers..........℔ lb 20c
Smiths' Hand.......... 20c
Handles.—No. 1 Fork, Hoe and Rake..........dis 20 %
No. 2 Fork, Hoe and Rake..........dis 40 %
Harrow Teeth.—1 inch iron..........℔ lb 4½c
⅞ and ¾ inch iron.......... 4¾c
Barbed or Headed..........½c extra
Hay and Cotton Presses.—
Dederick's Railroad..........net list
" Perpetual..........net list
Hay Knives.—
Dunn Edge Tool Co.'s..........℔ doz $15 00—dis 15&5 %
Lightning (Weymouth's Patent)..........℔ doz $20 50
Hinges—
Wheeling Hinge Co.'s Strap & T..........dis 33⅓&10 %
Horse Hay Fork.—Nellis' Harpoon..........dis 25 %
Horse Nails.—National Patent Pointed.... 20c rates
National Patent Pointed, extra finished........25c "
Horse Powers.—Pitts or Carey's Patent.......dis 10 %
Wheeler's Railway..........dis 10 %
Sandwich Lever..........dis 10 %
Horse Rasps.—Heller Bros..........dis 45 %
"Black Diamond"..........$6·00 to the £ currency
Horse Shoes.—
Rhode Island (Perkin's Pattern)..........℔ keg, $5 50
" Mule.......... " 6 50
" Trotting Shoes.......... " 8 00
Tredegar Horse..........per keg $5 50
" Mule..........per keg 6·50
Hose.—
Boston Belting Co.'s Rubber Medium Sizes, dis 10&10 %
" " " Small Sizes, Hydrant..........dis 40 %
Ice Tools.—W. T. Wood & Co.'s Saws ....new list net
W. T. Wood & Co.'s Chest Hatchets........new list net
" " Axes..........new list net
" " Loading Tongs..........new list net
" " Medium, Small and Family Tongs.......new list net
" " Chisels, Hooks and Grapples..........new list net
Mattocks and Grub Hoes.—
Klein, Logan & Co.'s Mattocks...℔ doz $13 00 @ 13 50
" " Grub Hoes, oval eye.......... " 10 00 @ 11 50
Money Drawers.—
Pierpont & Co.'s Excelsior..........per doz $40·00 net
Nails.—Wheeling Riverside Brand..........$5·00 rates
Packing.—Boston Belting Co.'s Rubber, Plain..dis 30 %
Boston Belting Co.'s Rubber, Pure..........dis 25&5 %
" " No. 2 Plain..........dis 40 %
" " Round and Square....dis 10&10 %
Picks.—Klein, Logan & Co's Railroad and Clay..........℔ doz $9 30 @ 11 00
Klein, Logan & Co.'s Coal.......... " 7 45 @ 8 40
" " Poll.......... " 12 60 @ 13 50
" " Stone.......... " 14 40 @ 14 90
" " Tamping.......... " 14 75 @ 15 35
" " Miners' Drifting.......... " 10 25 @ 12 80
Plows.—Avery's Cast and Steel..........dis 20 %
Collins Cast Cast Steel..........new list net
Pekin Steel..........new list dis 15 %
Post Hole Augers.—Clark's Patent—
No. 1, ℔ doz. $27; No. 2, $30; No. 3, $32.......... dis 20 %
Pulleys.—5 inch..........per doz $4·25 net
4 inch..........per doz 3·25 net
Nellis' Patent..........new list dis 15 %
Pumps.
St. Louis, Farm, Patent Metal Lined...new list dis 50 %
Rakes.—Paddock's Premium Sulky..........$28 00 net
St. Louis Revolving 14 tooth.......... 5 00 net
" " 16 " .... 5 25 net
" Hand Hay Rake..........dis 20 %
Reaper Knives and Sections.—
Geo. Barnes & Co.'s Knives..........dis 25 %
" " Sections..........dis 40 %
Road Scrapers.—Steel..........dis 25 %
Cast Iron..........dis 10&5 %
Sad Irons.—Monitor Brand, Silver Polished..℔ lb 4½c
Sash Weights.—Standard Solid Eyes..........℔ lb 4c
Saws.—Curtis & Co..........dis 10 %
Scythes.—Dunn Edge Tool Co.'s..........dis 30 %
Scythe Stones.—No. 1 Ind'n Pond ℔ gr's, $7 00 }
Extra Indian Pond.......... " 7 50 }
Premium.......... " 10 50 } dis 25 %
Diamond Grit.......... " 13 00 }
Shovels and Spades.—H. M. Myers & Co....dis 30 %
Grain Scoops, Pat. Cor'd Straps H. M. M. & Co...dis 30 %
" " " M. Rowland & Co..dis 30 %
" " " O. Ames & Son..dis 20 %
Sledges.—Smith's Stone or Coal Sledges—
Steel Face Polished..........℔ lb 15c
Solid Cast Steel.......... " 35c
Snaths and Cradles.—Seymour Mfg. Co.'s .dis 20 %
Sorghum Machinery.—Bell Cane Mills.... dis 15 %
Scantlin's Seamless Evaporators..........dis 10 %
Springs.—Cleveland Spring Co.'s—
Carriage and Express..........dis 12½ %
Blue Seat Springs..........dis 15 %
Vises.—Solid Box..........℔ lb 16c
Wilson Mfg. Co.'s..........dis 15 %
Wheelbarrows.—Champion Iron wheel..℔ doz $35·00
Champion Wood Wheel..........℔ doz 36·00
Wrenches.—Coes' Genuine........... dis 33⅓ %
Coes' Pattern..........dis 50
Wagons.—Whitewater Farm Wagons—
Thimble Skein..........No. 3, $74; 3¼, $78; 3½, $79
Iron Axle..........No. 1½ $78; 1⅝, $81; 1¾, $88

St. Louis Metal Market.

(*Corrected Weekly by Messrs. R. Sellew & Co.*)

Tin Plate.

IC, 10x14, Best Char..	$ 9·50	IX, 14x20, Roofing....	$11·50
IX, 10x14, " ..	12·00	IC, 20x28, "	19·00
IC, 12x12, " ..	10·00	IX, 20x28, "	23·50
IX, 12x12, " ..	12·50	IC, 10x14, Coke...	8·50 @ 9·00
IC, 14x20, " ..	10·00	IC, 14x20, "	9·00
IX, 14x20, " ..	13·00	IC, 10x20, "	14·00
IC, 14x20, Roofing....	9·00		

Usual difference for odd sizes.

Block Tin.
Large Pigs..........25c | Bars..........27c
Small " L. & F.... .. 26c |
Sheet Zinc.
Casks..........℔ lb 10½c | Sheet..........℔ lb 11c
Solder.
No. 1, Refined, in bars or plate..........16c
No. 2, " " " 15c
Pig Lead..........7½c
Sheet Copper.—14 to 100 lbs. Sheets 30x60.......31c
10 to 12 lbs., " " and 30x72..........32c
6 to 9 lbs., " " 35c
Tinned, 14 and 16 oz. 14x48..........32c
Planished, 14 and 16 oz. 14x48..........39c
" No. 7, 8 and 9..........41c
Copper Bottoms..........34c

Sheet Iron —	Com'n.	Sm'th.	Char'l.	Jun'ta
No. 16 to 20..........	4½c	4½c	6½c	7⅜c
No. 22 to 24..........	4½c	4⅝c	6½c	7⅝c
No. 26..........	4½c	5 c	6½c	8 c
No. 27..........	4⅞c	5¼c	6⅞c	8½c

Galvanized Iron..........dis 30 %
Iron Rivets..........dis 25 %
Iron Wire..........dis 35 %
Coppered Pail Bail Wire..........dis 20 %
Copper Rivets and Burs..........dis 20 %
Genuine Russia Iron.
Perfect—No. 9, 10, 11, 12..........per lb. 17c
Stained—No. 9, 10, 11, 12..........per lb. 16c
Tare 22 lbs to Bdle. For less than 1 Bdle. add 1c. ℔ lb.
Retinned Stamped Ware..........dis 20 %

CHICAGO.

(*Reported by Frank Sturges & Co., 72, 74 & 76 Lake St.*)
September 10, 1875.

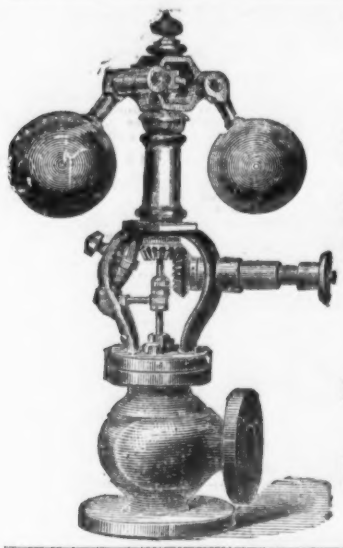
Tin Plate.—

10x14, IC, Ch'l. Good.	$	14x20, IX, Ch' Best.	$13 00
10x14, IC, " Best.	9 50	14x20, IXX, " "	15 50
10x14 IX, " "	12 00	14x20, IXXX, " "	18 00
12x12, IC, " "	10 00	DC, 100 Plate, " "	9 50
12x12, IX, " "	12 50	DX, " "	12 00
14x20, IC, " "	10 50	DXX, " "	14 50
		DXXX, " "	17 00

Roofing IC, Charcoal, Best..........9 00
Roofing IX, Charcoal " 11 50
20x28, IC, Charcoal Roofing, Com..........18 00
20x28, IC, " Good..........18 50
20x28, IC, " Best..........19 00
20x28, IX, " 23 50
10x14, IC, Coke Plates..........8 50 to 8 75
14x20, IC, " ....9 00 to 9 50
10x20, IC, " 14 00
Block Tin.—
Large Pigs.......... 27c | Bars..........29c
Small..........28c |
Zinc.—Sheet, 500 to 1000 lb. Casks..........10½c
Loose Sheets..........11c
Slab Zinc or Spelter..........7½c
Copper.—Bottoms..........34c
Sheathing..........32c
Planished..........39c
" Boiler lengths..........41c
Ingot..........—
Bolt..........35c
Braziers' Sheets.—
30x60, 6 & 7 lbs.....℔ lb 39c | 30x60, 10 & 12 lbs...℔ lb 33c
30x60, 8 & 9 lbs.... " 37c | 30x60, 15 to 100 lbs. " 32c
Solder.—F. S. & Co.'s make.
Best Fine..........20c
No. 1..........19c
Roofing..........17c
Braziers' or Spelter Solder..........35c
Antimony..........18c
Babbit Metal—F. S. & Co.'s..........16c
No. 2..........14c
Sheet Iron.—

	Common.	Smooth. Com.	Smooth Charcoal.	Smooth Juniata
No. 24........	4½c	5½c	6½c	8⅜c
25 & 26...	4½c	5⅝c	7 c	9 c
27........	4⅞c	6 c	7½c	9½c

Galvanized Iron..........dis 30 %
No. 16 to 20..........12c | No. 27..........15c
21 to 24..........13c | 28..........16c
25 & 26..........14c |
Russia Iron.— | No. 1 Stained..........16c
Perfect..........17c | In Sheets, 1c. higher.
American Russia.— | B..........11c
A..........14c | In sheets, 1c higher.
Lead.— | Lead Pipe, in full coils..8½c
Pig..........7½c | Lead Pipe, when cut..8¾
Bar..........8½c | Sheet Lead..........9½c
Wire—Bright..........dis 35
Coppered..........dis 25



TO ALL WHO USE STEAM-POWER!

We will put our Governor on any Engine, and guarantee it to prove itself superior to all others.

If, after a fair trial, it does not, we will take it off at our own expense.

Shive Governor Co

BETHLEHEM, PA.

ALSO,

SHIVE'S PATENT WATCHMAN'S CLOCK AND DETECTOR,

AND

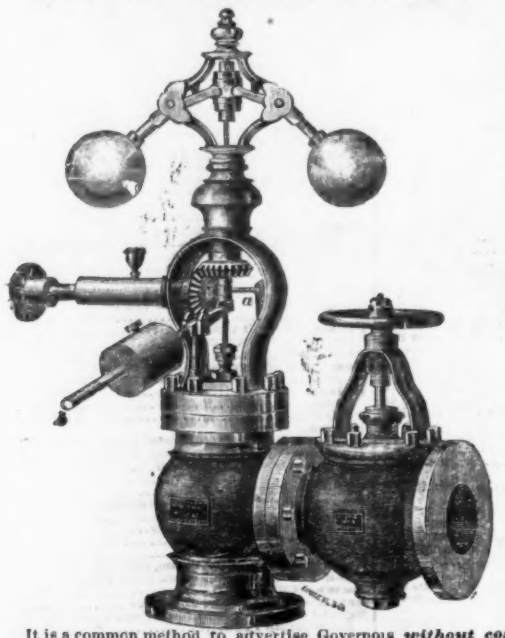
Buoy's Patent Counter Scale,

No Nest of Weights.

Circulars sent free

February 10, 1875. REDUCED PRICE LIST OF THE

JUDSON PATENT IMPROVED GOVERNORS.



☞ When Governors are ordered, be particular and say Governor with Stop Valve, or without Stop Valve; and either Black, Finished or Portable, as you may require, and with or without Lever Attachment.

For dimensions and other particulars send for Illustrated List.

Capacity of Valve or Diameter of Steam Pipe in inches.	Price, Black.	Price, Bright Finish.	Price, Portable.	Price of Lever Attachment for altering speed.	Price of Stop Valve.
¾	18·00	20·00	17·00	..	..
¾	20·00	22·00	19·00	..	..
1	24·00	27·00	22·00	2·00	5·25
1¼	29·00	32·00	27·00	2·25	6·66
1½	34·00	38·00	31·00	2·50	8·50
2	41·00	46·00	38·00	2·75	11·50
2¼	47·00	54·00	..	3·25	16·00
2½	50·00	57·00	47·00	3·50	17·00
2¾	55·00	62·00		3·75	19·00
3	62·00	70·00	No Larger Portable made than 2½ in.	4·25	22·00
3¼	71·00	80·00		4·50	27·00
4	81·00	92·00		5·00	32·00
4¼	91·00	103·00		5·50	37·00
5	102·00	114·00		6·00	42·00
5¼	116·00	129·00		6·50	48·00
6	134·00	148·00		7·00	55·00
7	160·00	176·00		8·00	69·00
8	199·00	219·00		9·00	83·00
9	230·00	253·00		10·00	..

No Charge for Boxing & Cartage.

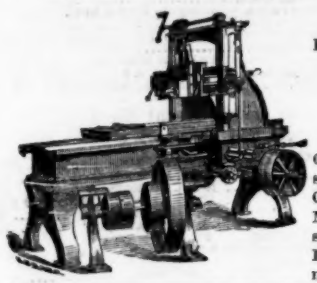
It is a common method to advertise Governors ***without cost***, unless satisfactory to the customer, and then charge ***High Prices*** for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in buying other Governors should stipulate that their durability be guaranteed, and should also take care that they do not, for much inferior Governors, pay higher prices than those shown in the above list. We guarantee the Judson Governor will do all any other Governor can do, and in Accuracy and Durability—the main essentials—we guarantee it shall do more.

JUNIUS JUDSON & SON, Rochester, N. Y.

The Pratt & Whitney Co.,

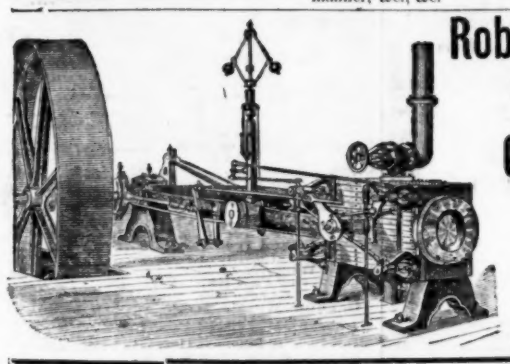
Hartford, Conn.,

Have constantly on hand and making



Drop Hammers

Of recently Improved Construction. Pony Trip Hammers, Blacksmiths' Sheaves, Broaching and Stamping Presses, Iron Shop Cranes, Machinists' Tools, Gun and Sewing Machine Machinery. Make to order Gray and Charcoal Iron Castings of all styles and sizes not exceeding 15 tons weight, (making patterns if desired). Furnish Clamp Pulleys of light patterns, cut gears in a superior manner, &c., &c.



Robt. Wetherill & Co

CHESTER, PA.

Corliss Engine BUILDERS

AND

Boiler Makers.

THORNE, DeHAVEN & CO.

21st Street, above Market,
PHILADELPHIA.

DRILLING MACHINES.

PORTABLE DRILLS. Driven by power in any direction, self-feed and convenient adjustment.

RADIAL DRILLS. Self-feed—large adjustable box table—separate base plate, every convenience.

VERTICAL DRILLS. Self-feeding—of new and improved designs.

MULTIPLE DRILLS. For boiler work, etc., 2 to 20 spindles, fed and returned by power or hand, together or separately.

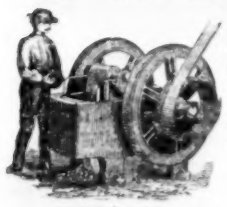
HORIZONTAL BORING AND DRILLING MACHINES. For large pieces—with boring head, adjustable, vertically and horizontally.

SPECIAL DRILLS. For special work. Gun Blank Drills, Coal Drills, &c., built to order.

BLAKE'S PATENT

STONE & ORE BREAKER.

New Pattern with Important Improvements & Abundant Strength



For reducing to fragments all kinds of hard and brittle substances, such as STONE for making the most perfect McADAM ROADS, and for making the best CONCRETE. It breaks stone at trifling cost for BALLASTING RAILROADS It is extensively in use in MINING operations, for crushing

IRON, COPPER, ZINC, SILVER, GOLD, and other ORES.

Also for crushing **Quartz, Flint, Emery, Corundum, Feldspar, Coal, Barytes, Manganese, Phosphate Rock, Plaster, Soapstone, &c.**

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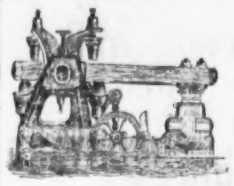

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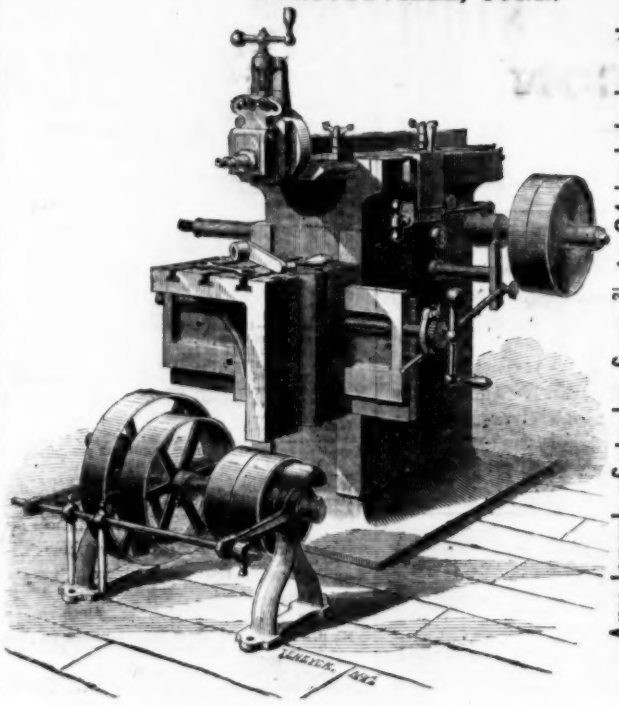

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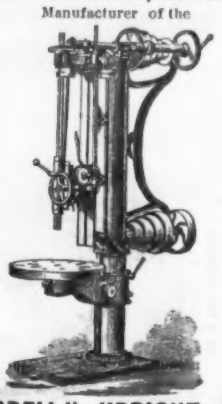

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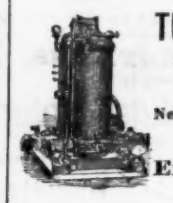

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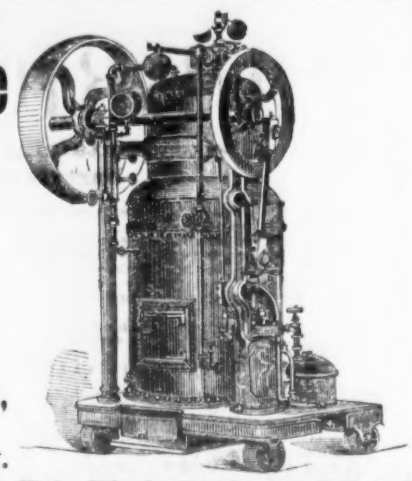

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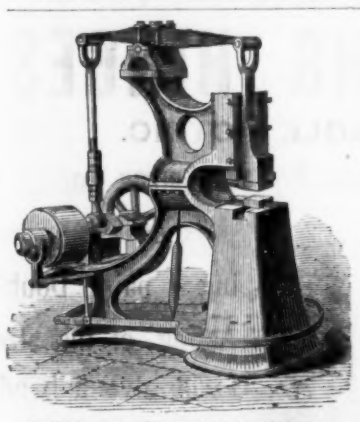

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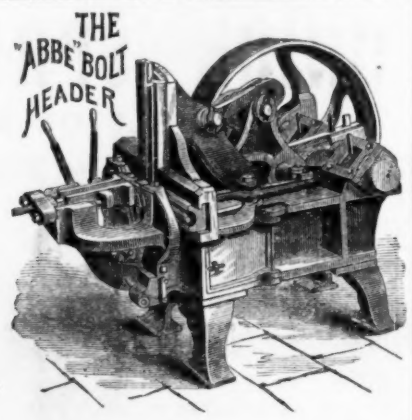

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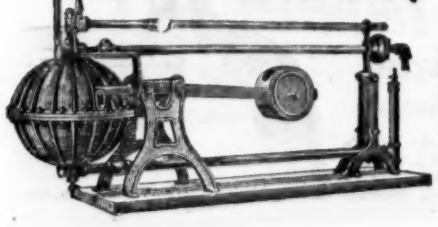

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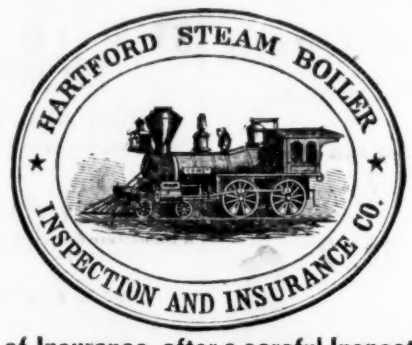

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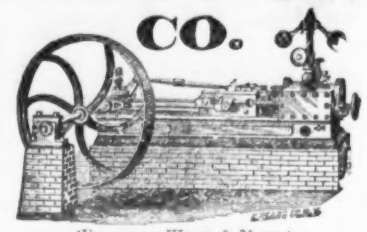

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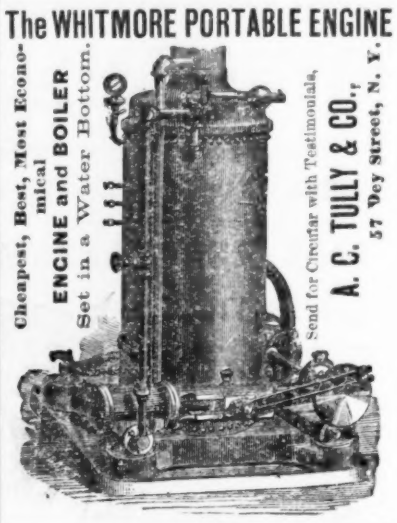

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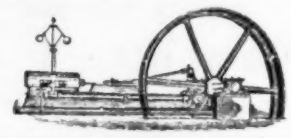

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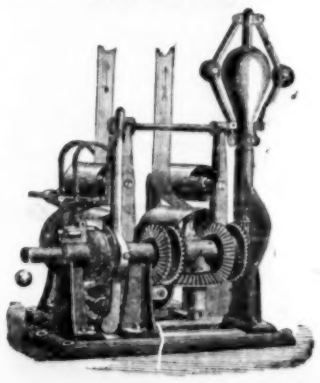

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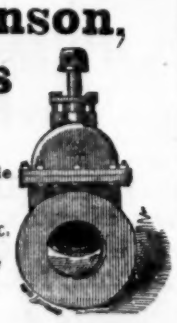

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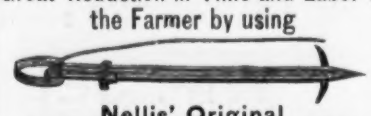

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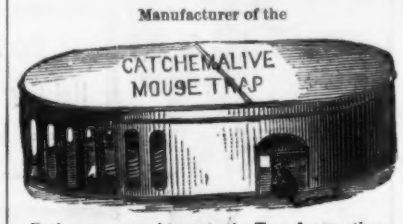

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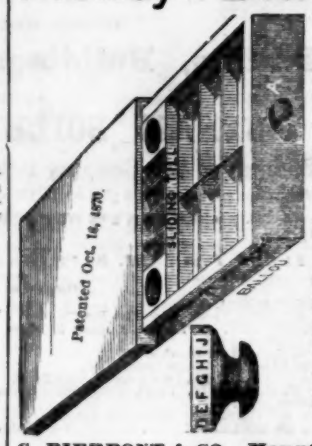

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Put up in Boxes containing 5, 10, 25 and 50 lbs. and in barrels of 200 lbs.

This article is prepared with great care, has more body than that prepared by any other party, and is as near perfect as possible.

We were the first manufacturers to put up Plumbago as a Lubricator; and the experience of years has shown that it will save more than half the expense of oil or grease, will absolutely cool off a hot journal, and save nearly all the wear, the axles or shafts being glazed over with it, and running almost without wear. A car axle will run four or five times as long if our Lubricating Plumbago is used freely. A second-class article, however, is worse than none, because it contains a grit that will wear both the shaft and the box.

If Engineers, Experts and Purchasing Agents knew how much wear and power would be saved by its use, no shaft or axle would revolve without it; every shop and car would have it at hand.

The Journal of the Franklin Institute says:

"Every one knows that for heavy machinery plumbago is a good lubricant, but every one does not always think of applying it where it would serve best. It may be of value to some of our readers to know that a planer whose bed-plate required the force of eight men to slide it when lubricated with the best ordinary material, was easily shifted with one hand when plumbago of good quality was applied."

It is pure, very finely pulverized, is free from grit, and is prepared by the most expert manufacturers of **PLUMBAGO GOODS** in the world. Send for envelope sample.

THE JOS. DIXON CRUCIBLE CO.,

ORESTES CLEVELAND, President,

237, 239, 241 and 243 Railroad Ave., 250, 252, 254 and 256 Wayne Street, JERSEY CITY, N. J.

Russell, Burdsall & Ward,

PORT CHESTER, N. Y.

Manufacturers of

Carriage, Tire, Plow, Stove AND OTHER

BOLTS.

Carriage Bolts made from Best Square Iron, a Specialty.

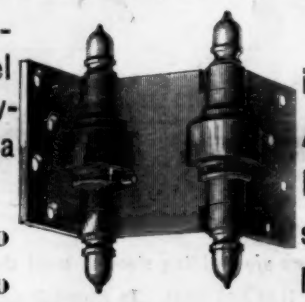
UNION SPRING HINGES.

DOUBLE OR SINGLE ACTING.

Especially adapted for Mosquito, Fly and Screen Doors.

Size 2½x2½, Japanned, with Nickel Plated Springs—giving a neat finish to a door.

Single Acting, Per Pair - - $1·00
Double Acting, Per Pair - - $2·00



To dealers ordering 4 pairs Double Acting, of this size, I will give a handsome Black Walnut Model.

The DOUBLE ACTING UNION SPRING HINGE is the best and cheapest appliance known for swinging a light door both ways.

WAREROOMS, 79 Chambers St., N. Y.

M. W. ROBINSON, Sole Agent.

THE

American Spiral Spring Butts

ARE

Very Desirable

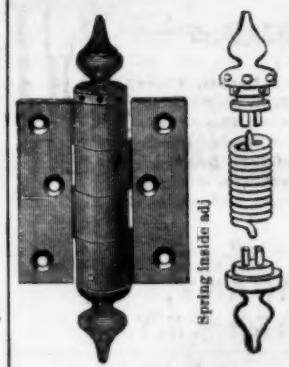
FOR THE DOORS OF

Banks, Stores, Churches & School Houses.

AND FOR ALL

Outside Winter Doors.

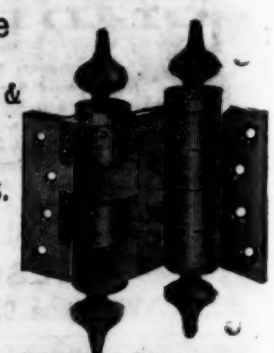
Used on the National Capitol, Patent Office, Treasury, Plymouth Church, A. T. Stewart's Stores, Booth's Theatre, Windsor Hotel,



Spring inside adj

SINGLE ACTION BUTT, SWINGS DOOR ONE WAY.

and on prominent buildings throughout the country.



DOUBLE ACTION BUTT, SWINGS DOOR BOTH WAYS.

MANUFACTURED BY

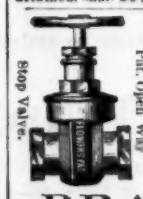
AMERICAN SPIRAL SPRING BUTT CO., 82 Beekman Street, N. Y.

DERBY SILVER CO., Derby, Conn.,

Manufacture the most reliable

SILVER PLATED SPOONS & FORKS.

They are plated by weight, and not by time or guess, containing 20 per cent. more silver than the usual standard, on a base of Nickel Silver, and finished by hand. Each article is guaranteed by the trade mark and warranted to give full satisfaction. We ask of the trade a fair and impartial test, assuring them that the high standard already attained, shall be maintained. Send for Catalogue and Price.



Stop Valve.

Pat. Open Way

Schofield's Pat. Gauge Cock.

HENRY C. MEYER & CO.,

Manufacturers of

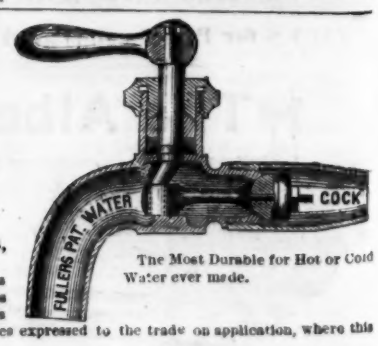
BRASS WORK

For Water, Gas and Steam.

Importers and Dealers in PLUMBERS' MATERIALS,

46 & 48 Cliff Street, N. Y.

Specialties manufactured and controlled by us: Fuller's Patent Faucets and Mineral Water Cocks; Murdock Hydrants and Street Washers; Flower's Open Way Valves; Schofield's Gauge Cocks; Hall's Lock Gas Cocks. Illustrated Catalogues expressed to the trade on application, where this advertisement is referred to.



The Most Durable for Hot or Cold Water ever made.